SOIL SURVEY OF KERSHAW COUNTY, SOUTH CAROLINA.

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DESCRIPTION OF THE AREA.

Kershaw County is located in the north-central part of the State of South Carolina, the center of the county being approximately 35 miles northeast of Columbia. The county, which is irregular in outline, has a maximum extent of about 40 miles from northeast to southwest and of 35 miles from north to south. It includes an area of 760 square miles, or 486,400 acres.

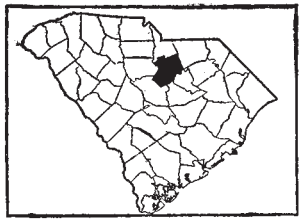

FIG. 16.—Sketch map showing location of the Kershaw County area, South Carolina.

The physiography of Kershaw County is fairly representative of the region lying along the fall-line between the Piedmont Plateau and the Coastal Plain. Practically all of the area, except a broad strip extending from about the center of the county to the southern border, is high and more or less broken or hilly.

Through the north-central and, to a less extent, in the southwestern part of the county, broad, flat-topped ridges are developed. To the south of this the surface is more broken, but the hills have gentle slopes. To the north the country is sharply broken to hilly. The valley of the Wateree River is the most conspicuous physiographic feature of the county. Throughout the northern part of its course in the county to a point a short distance above Camden the valley is narrow, with comparatively steep valley walls, but south of this point, where the river passes out of the Piedmont Plateau, it flows in a broad valley, including extensive flood-plain and terrace areas and bordered by low, gently sloping hills. Lynches River, flowing along the eastern boundary of the county, has not cut so deep or wide a valley as the Wateree River.

The county may be divided into six physiographic regions, in which the topography, elevation, and general characteristics differ: (1) The Piedmont region, which includes the areas of crystalline rocks and the slate belt; (2) the Sand Hill region; (3) the Red Hill

region; (4) the ancient terrace or level Coastal Plain region; (5) the river terraces; (6) the present flood plains.

The Piedmont region covers the northwestern fourth of the county, including the section north and west of a general line from Kershaw to Clyburn, following Granneys Quarter Creek to the vicinity of Granneys Quarter, thence to Hollins Mill on Sanders Creek, following that stream to the Wateree River, and west of the river passing just north of Rabon Crossroads, and thence to the Fairfield County line a little north of Bellfield. It is a high plateau, sloping gently to the southeast, which has been severely dissected by erosion. Short streams ramify all parts of the upland, reducing the topography to broken and hilly, with a few gently sloping hillsides on the north side of the main drainage ways and narrow strips of bottom land adjacent to the streams. Small areas of fairly level ridge tops, remnants of the ancient plateau, are still to be found in places. The elevation of the hills ranges from 50 to 300 feet above stream level, and the general elevation of the region ranges from 200 to 600 feet above sea level.

The Sand Hill region occupies the eastern half of the county and a large area in the southwest corner. It is the most extensive region in the county. The topography varies from fairly level to gently rolling and hilly. Throughout the northeastern and central parts of the county broad, flat-topped ridges are developed, in which there are very few streams, but numerous streams head along the sides of these ridges, giving rise to a broken and steep topography. Nearly all of the Sand Hill region in the southern part of the area is cut by small streams, giving a rolling to hilly relief, the hills as a rule having fairly smooth and gentle slopes as compared with the Piedmont country. The streams are longer and have more direct courses than those of the Piedmont region. Many of the larger streams have only a few short heads, which rise in large springs along the edge of the sand ridges. The elevation varies from 200 to 650 feet above sea level, with most of the surface between 400 and 500 feet.

The Red Hill region lies in the western part of the county, between the Piedmont and the Sand Hill regions. It extends in a broken and irregular strip from the vicinity of Knights Hill between Sanders Creek and Camp Creek westward, north of Twentyfivemile Creek. The elevation ranges from 250 to 400 feet above sea level.

The level Coastal Plain is relatively small in extent. It forms an irregular-shaped strip lying between the Sand Hill region and the river terraces, from the south side of Camp Creek to the Sumter County line. The topography is fairly level to gently undulating to moderately rolling. The surface has the appearance of a terrace and in places contains poorly drained depressions. This division is cut by numerous streams that head in the Sand Hill region. There

is a range of 100 feet in elevation, or from 150 to 250 feet above sea level.

River terraces are most prominently developed along the lower reaches of the Wateree River, being found in a somewhat broken belt about a mile wide on both sides of the river "swamps" below the mouth of Twentyfivemile Creek and Camp Creek and extending to the Sumter County line. The terrace formation is broken by many streams and indentations of the river swamps. The surface lies 5 to 35 feet above the level of the first bottom. Smaller terrace areas are developed along Lynches and Little Lynches Rivers, in the eastern part of the county.

The first bottom, representing the present flood plain of the streams, is found in its largest development along the Wateree River below Camden, where it averages 3 miles in width, to the Sumter County line. The next largest development is on Lynches River below the mouth of Buffalo Creek, where the bottoms range from one-half to one mile in width. Smaller bottoms, mainly along the lateral drainage ways, range from one-fourth to one-half mile in width.

Along the smaller streams the flood plains are for the most part less than one-quarter mile wide. The topography is fairly level. The surface lies from a few feet to 20 feet above stream level, and is subject to overflow. The main stream channels are 100 to 200 feet above sea level.

The drainage of the county is effected by three systems—the Wateree River, Lynches River, and Black River systems. The main drainage divide between Lynches River and the Wateree River follows the old Georgetown Road from the corner of the county just south from Heath Springs (Lancaster County) to Cassatt. At this point the divide forks, one prong continuing along the old Georgetown Road to the Lee County line, forming the divide between Lynches River basin and the Black River basin, and the other passing from Cassatt to Antioch (Lee County), forming the divide between the Wateree and Black Rivers.

The Wateree River drains the western part of the county, the drainage basin covering about two-thirds of the county. Lynches River drains the northeastern part of the county, and Black River the southeastern corner.

The Piedmont Plateau is well drained throughout its entire extent, the run-off being rapid and erosion active. The run-off in the Sand Hills amounts to very little; the rainfall percolates downward through the sand and finds its way out through subterranean channels, giving rise to numerous springs along the base of the hills. The Red Hill region is well drained. The level Coastal Plain is fairly

well drained, except for scattered depressions. The run-off in this division is not rapid enough to cause erosion and the underdrainage is not excessive.

The terraces occur in relatively narrow strips, and although the surface is comparatively level, the drainage water is fairly well removed from most of the types. Small areas of low-lying terrace are poorly drained. Practically all the first bottom is subject to overflow and most of it is poorly drained.

Below Camden there is little fall in the Wateree River; its current is sluggish and its course meandering. Above this point the fall is greater. The Wateree hydroelectric development is situated about 8 miles north of Lugoff, where a large dam is being constructed, the backwater of which will reach to the county line and beyond. The electric power will be transmitted to towns throughout this section.

Where the larger creeks break from the upland to the river lowlands, and where the streams pass from the Piedmont to the Coastal Plain, the currents are swifter, and a number of small water powers have been developed at these points. These are used for operating grist mills and cotton gins. A fairly large dam on Big Pine Tree Creek near Camden is utilized to develop power for a cotton mill.

Fredericksburg District, on the east bank of the Wateree River, was surveyed in 1733, preparatory to colonization. The first permanent settlements were made by Irish Quakers about 1750, who took up the rich river bottom and terrace land on both sides of the Wateree River for several miles above and below the entrance of Big Pine Tree Creek. The first town was founded shortly afterwards at Pine Tree Hill, within the present limits of the city of Camden. The town of Camden was founded in 1768, and in 1798 was laid out essentially as the main part of the town stands to-day. Later immigration brought many settlers from England, Ireland, Scotland, and France.

Kershaw County was formed from Camden District when the districts were divided into counties in 1795, and is at present as originally laid out, with the exception of a small area along the southeast boundary, taken to form part of Lee County in 1902.

The present population of Kershaw County is descended largely from the original settlers, and according to the 1920 census amounted to 29,398, of which 12,333 are white and 17,065 are colored. Most of the negro population is found around Camden and along the Wateree River terraces and adjacent level upland. Of the population, 86.6 per cent is classed as rural, and density of the rural population is 37.8 persons per square mile. The most thickly populated district is around Camden and south to the Sumter County line.

Camden, the county seat of Kershaw County, the largest and most important town, with a population of 3,930 in 1920, is located in the south-central part of the county, upon a terrace 222 feet above sea level, about 2 miles from the Wateree River and near the head of navigation upon that stream. The tracks of the Seaboard Air Line and Southern (Charlotte Branch) Railroads cross here. It is the center of a prosperous agricultural community, and its industries consist of two cotton mills, an oil mill, and fertilizer works, and a veneering plant. Besides being an old and historic town, it is a well-known and popular winter resort, supporting four large tourist hotels.

Kershaw, the next town of importance, is situated upon the Lancaster-Kershaw County line, the line passing near the center of the town. The population in 1920 was 1,151, of which 463 reside in Kershaw County.

Bethune, in the eastern end of the county, on the Seaboard Air Line Railroad, is the third town in importance, with a population according to the 1920 census of 299. Blaney, Lugoff, Cassatt, and Westville are other small towns.

Kershaw County is well supplied with rail transportation. The Seaboard Air Line (main line) passes through the county in a northeast and southwest direction. The Northwestern Railroad of South Carolina operates trains from Camden to Sumter. The Southern Railway crosses the county from north to south, affording transportation facilities at Kershaw, Camden, and several smaller towns and sidings.

The main roads are fairly good, considering the character of country which they traverse. The Atlantic Highway, or Capital to Capital Highway, closely parallels the Seaboard Air Line Railroad and has a sand-clay surface throughout its entire distance. The Charlotte Road, which parallels the Southern Railroad from Camden to Kershaw, is a sand-clay road throughout most of its length. The Sumter road (Georgetown Highway) and Bishopville road (Peedee Highway) are both sand-clay roads, and other roads have sand-clay surfaces over parts of their extent. The secondary roads and nonimproved roads in the Sand Hill region are made difficult by the deep sand, and those in the Piedmont region are usually rough at all times and muddy in wet weather. The stream and swamp crossings on the main roads are fairly good, but upon the secondary roads they are poor.

All of the small towns and parts of the rural districts have telephone service.

Camden is the chief local market and Columbia and Sumter are the nearest outside markets.

CLIMATE.

The climate of Kershaw County is characteristic of the Sand Hill belt, the winters being short and mild and the summers long and hot. The mean temperature for the winter months, December, January, and February, is 46.3° F., the absolute minimum recorded is 11° F., and the maximum 85° F. The mean temperature for the summer months, June, July, and August, is 78.8° F., the minimum 58° F., and the maximum 105° F., recorded in July. Temperatures below freezing in winter are rare and those above 100° F. in summer are of short duration.

The annual average precipitation of 44.42 inches is well distributed throughout the year, the heaviest coming during the summer months, when it is needed by the growing crops. In some years heavy August rains cause the streams to overflow, doing considerable damage to crops upon the bottom land. The snowfall amounts to only a trace during most winters, with a few light snows during the colder winters.

The average date of the last killing frost in spring is March 21 and the average date of the earliest in fall is November 7, giving an active growing season of eight months.

The climate is well suited to the growing of cotton and general farm crops and to stock raising.

The following table, compiled from the records of the Weather Bureau station at Camden, gives the more important climatic data for Kershaw County:

Normal monthly, seasonal, and annual temperature and precipitation at Camden.

[Elevation, 222 feet.]

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1869).	Total amount for the wettest year (1901).
	°F.	°F.	°F.	Inches.	Inches.	Inches.
December	44.0	85	12	3.33	6.67	5.37
January	48.0	78	15	3.34	2.48	3.75
February	46.8	80.	11	4.14	3.22	2.52
Winter	46.3	85	11	10.81	12.37	11.64
March	50.3	88	25	3.63	2.12	6.49
April	62.4	93	28	3.11	1.31	5.14
May	72.0	103	42	3.21	1.93	6.28
Spring	61.5	103	25	9.95	5.36	17.91

Normal monthly, seasonal, and annual temperature, etc.—Continued.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1869).	Total amount for the wettest year (1901).
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*
June	79.6	104	51	4.53	1.79	6.34
July	79.8	105	58	4.85	4.22	3.69
August	77.2	102	57	5.38	2.52	9.75
Summer	78.8	105	58	14.76	8.53	19.78
September	71.4	97	42	3.82	1.11	8.24
October	64.7	95	32	2.73	0.35	0.45
November	52.7	85	24	2.35	2.38	0.63
Fall	62.9	97	24	8.90	3.84	9.32
Year	62.4	105	11	44.42	30.10	58.65

AGRICULTURE.

The early settlers were attracted to this section by the rich bottom land along the Wateree River in the vicinity of the mouth of Big Pine Tree Creek, and settlements were made on both sides of the river for a distance of 6 miles above and below this point. As shown by plots of the early grants, they occupied narrow strips, reaching from the river back to the upland, each grant covering 50 to 600 acres. The early settlers planted corn, wheat, oats, flax, and tobacco. An early chronicle describes a freshet in the Wateree River in 1795, which destroyed corn, oats, and hogsheads of tobacco. Cotton planting is mentioned in 1797, the report stating that it had just been introduced, but it did not become an important crop until about 1850. Rice planting began upon the low bottom land soon after its introduction in this State, but was not grown extensively until after the introduction of water culture in 1783. Indigo was grown, but ceased to be a profitable crop with the removal of the bounty by the British Government during the Revolutionary War. Stock raising was important during the early period.

The Civil War brought a great change in the agriculture of the county. The increased cost of keeping up ditches and dikes caused the abandonment of rice culture to a great extent, and subsistence crops ceased to be grown upon the scale that they were before the war, while the high price of cotton soon led to its becoming the main money crop. Up to about 30 years ago the river terrace, the

adjoining Coastal Plain, and the Piedmont soils were the only land used for crops, but since that time a steady advance has been made upon the sand barrens, and at the present time most of this region, with the exception of the more prominent sand hills, are in cultivation. The use of commercial fertilizers has made this evolution possible.

Within the last few years tobacco growing became quite an industry in the Liberty Hill section, but owing to the distance from markets its cultivation was abandoned.

Rice culture was continued on the lowlands of the Wateree swamps below Lugoff until a few years ago, but floods and the high price of cotton has caused the interest in this industry to decline.

In 1879, according to census reports, 28,978 acres were planted to cotton, 21,891 acres to corn, and 2,849 acres to oats. The succeeding census reports of 1890, 1900, and 1910 show a steady increase in these crops.

The following table gives the crops grown, together with their acreage and yield, as determined by the 1920 census:

Acreage and yield of principal crops in Kershaw County in 1919.

Crop.	Acreage.	Yield.	Crop.	Acreage.	Yield.
		Bushels.			*Tons.*
Corn	37,888	623,094	Wild grasses	144	104
Oats	2,777	49,776	Grains cut green	1,617	1,128
Wheat	1,034	7,384	Annual legumes cut for hay	3,575	2,454
Rye	153	1,416	Silage crops	10	70
Dry peas	3,753	14,652	Coarse forage	21,208	7,416
Peanuts	23	204			*Gallons.*
Potatoes	107	6,588	Sorghum grown for sirup	270	12,019
Sweet potatoes	1,022	101,128			*Pounds.*
Other vegetables	23	.....	Tobacco	79	37,269
		Tons.			*Bales.*
Tame and cultivated grasses	1,696	1,558	Cotton	54,445	28,787

The total crop value of $8,253,521 is divided as follows: Cereals, $1,329,080; other grains and seeds, $60,107; hay and forage, $370,008; vegetables, $398,787; fruit and nuts, $19,512; all other crops, including cotton, $6,076,027.

The 1920 census reports the total value of all domestic animals as $1,668,800. The same authority gives the number of horses as 1,423; mules, 4,314; beef cattle, 2,119; dairy cattle, 6,784; sheep and goats, 741; swine, 14,724. Value of all dairy products, excluding home use of milk and cream, $114,896; value of chickens and eggs produced, $168,484.

At the present time the agriculture consists chiefly in growing cotton, which is the principal money crop, supplemented by corn,

oats, and cowpeas, with wheat, sorghum, melons, sweet potatoes, and peanuts as secondary crops. Rye, vetch, and clover are grown to a limited extent, and there are also in parts of the county small patches of alfalfa and tobacco. Vegetable gardens and small orchards are found upon nearly every homestead. The live stock upon most farms is confined to work animals used in the production of crops, but many farms keep a few cattle, milk cows, hogs, and chickens. Some attention has been given to diversification of crops by the leading farmers in the last few years, although under the "one-crop system," which has prevailed in this county since cotton became the main crop, it is difficult to make any marked advance in this direction. Improved cultural implements are being used, more attention is given to cover crops, and more legumes are being planted than formerly. Patches of alfalfa are an indication of an awakening to the need of better forage crops.

Cotton occupies an acreage almost equal to all other crops combined, and probably as much as four-fifths of the fertilizer purchased in the county is applied to this crop. The average yield is slightly more than one-half bale per acre, but ranges from one-fourth to over 1 bale. The results obtained by many of the leading farmers indicate that 1 to 1½ bales are possible upon the best soils under good management.

There has been a tendency for some years to reduce the cotton acreage, which has culminated in a substantial reduction this season, 1919, giving less acres per plow and enabling the farmers to handle the crop better. The uncertainty of labor for picking the crop is one of the causes of this reduction. Both short and long staple cotton are grown, more of the former being planted, as the yields are larger. Cotton is grown upon all the well-drained soils.

Corn is the second crop in importance, occupying an acreage equal to 70 per cent of the cotton acreage. It is grown in all parts of the area, on practically every soil. It furnishes the chief feed for work stock and cattle, also to some extent food in the home. The production does not meet the local demands, only a few farms having a small surplus to sell, while others are forced to buy corn shipped from outside sources. Most of the corn is stripped of the leaves and topped and the roughage used for stock feed. The ears are gathered and stored in cribs. There are very few silos in the county.

Most farmers use some fertilizer with corn, but not as much as with cotton. Manure is used to a small extent. Corn is grown under a modified form of the Williamson method upon the sandy upland soils, but old methods are used on heavier bottom land. The average yield, 16.5 bushels per acre in 1919, is less than the inherent fertility of the land would seem to warrant. This low production is due to inadequate preparation, cultivation, and fertili-

zation, and to the poor quality of seed used. A gradual improvement of farming methods, it is believed, is resulting in increased yields.

In addition to the acreage reported in oats in 1919, much of the acreage of grains cut green consists of this crop. Oats are grown mainly upon farms operated by owners. The crop is planted in the fall, the seed being sown broadcast, usually with fertilizer and nitrate of soda applied in varying amounts as a top dressing in the spring. The fields are usually small and most of the crop is cut with cradles, tied in bundles, and fed from the sheaf, very little being thrashed. If the crop fails to fill, as is likely in dry seasons, it is either turned under or cut green for hay. Oats are not grown in sufficient quantities for sale. The best yields are obtained upon the low sandy upland or upon artificially drained spots or bottom land.

Vetch is sometimes planted with oats and cut as forage. This crop is often followed by cowpeas. Oats are becoming more popular as a cover and forage crop.

Wheat was extensively grown in the county at one time, but the cheapness of western flour caused the crop to be almost abandoned. In 1909 only 75 acres were reported by the census, but under the stimulus of high prices 1,034 acres were reported in 1919. Rye is grown to a small extent, usually as a winter cover crop. Cowpeas are grown to some extent, either between the corn at the last working or following oats. In the former case they are allowed to mature and the peas are gathered, but when sown broadcast they are cut for hay. Crab grass often comes in as a volunteer crop and is cut with the pea vines.

Sweet potatoes are grown to some extent upon nearly every farm. They are produced mainly for home consumption, but a few farmers have a surplus which is sold in the local markets. They are grown more extensively upon the lighter soils, where good yields of excellent quality are secured. They are stored in cone-shaped sand beds called banks. Irish potatoes are grown upon small patches for home use.

All the vegetables common to this region are grown in home gardens, but truck crops are not grown commercially. Watermelons and cantaloupes are grown upon most farms, and some are sold in the local markets.

Sorghum is planted in small patches and made into sirup for home use.

Orcharding is given little attention, there being no commercial orchards, but most of the homesteads have small orchards. These consist mainly of peaches, with a few pears, plums, and summer varieties of apples. Some grapes are grown, usually Muscadines. The 1920 census reports 8,202 peach trees, 2,737 apple trees, and

809 grapevines. A number of pecan orchards have been set out upon the level Coastal Plain soils. The 1920 census reports 354 pecan trees of bearing age and 709 trees not of bearing age.

Stock raising is relatively unimportant, but cattle are ranged in the low bottom land along the Wateree River and a few in the other stream bottoms.

Upland pastures are few and mostly in the Piedmont region. Most of the cattle are of scrub stock, but a few of the leading farmers have introduced Hereford cattle and are improving their stock generally.

Cottonseed meal and hulls are used as winter feed in fattening cattle for market, especially when other feeds are scarce. Hogs are kept upon most farms in sufficient numbers to supply home demands, and are ranged in the swamps and fenced-off low places. Some Duroc-Jersey are found.

A few flocks of sheep are kept in the river bottoms below Camden and a small number throughout the Piedmont. Horses and mules for work stock are brought from outside sources. Dairying is developed to some extent around Camden to supply the local demand during the winter months, and some milk is shipped to Columbia. A few Jersey and Holstein herds are located in the vicinity of Camden. Milk cows are kept upon most farms to supply the home with dairy products. Poultry raising receives little attention, but a few chickens, guinea fowl, and turkeys supply eggs and meat for the home and for the local markets.

The influence of the physiography upon the general agricultural development is marked. The level Coastal Plain country has reached the highest development, while the Sand Hill region is the most backward. The topography has very little bearing upon the kind of crops grown or upon the distribution, but it has a strong influence upon the areas cultivated, especially those upon which terracing must be practiced. The Piedmont lands are not used as extensively for crops as at one time, owing to the activity of erosion upon the steeper slopes, many of which have been severely gullied. Many of the low, flat areas are poorly drained, while the low position of the river bottoms, which makes them subject to deep inundation, make crop production uncertain. Practically all the soils are used for all the crops, but the yields vary considerably with the depth of the sand mantle, the moisture-holding capacity of the soil, and its inherent productiveness. Much of the Sand Hill country, the low, poorly drained upland, and the poorly drained terrace and bottomland soils are in forest and not utilized for crop production.

Adaptation of crops to soils is recognized by the farmers only in a general way. The dark-colored, poorly drained upland and terrace soils, when artificially drained, are considered better suited to corn

and grain than to cotton; the shallow sandy upland soil is considered better cotton land than the deep sandy soils, while the bottomland is not considered as well adapted to cotton as it is to corn, grain, and grasses. The prevailing one-crop system almost precludes the restriction of any crop to the soil best adapted to it.

The general farming methods do not vary much over the county. Cotton stalks, after the crop is picked, are left standing until late winter or early spring, when they are broken with a stalk chopper or knocked down by hand with a stick. In preparing the land for cotton it is plowed to a depth of 3 to 5 inches and beds are made without further preparation. The better farmers plow a little deeper and harrow before bedding. Upon some of the sandy land the old rows are turned and the new beds made upon the old furrows without preliminary breaking. The beds are about 1 foot wide and 6 inches high and the rows from 3 to 4 feet apart, depending upon the productiveness of the land. The beds are dragged with a log drag and the cotton is planted upon the smooth surface with a planter or drill. It is chopped or thinned to one or two stalks to a hill from 10 inches to 1 foot in the row when a few inches high. Interrow cultivations are made with narrow sweeps until the middles are broken, then with a wide sweep as often as necessary to kill the weeds. The crop is laid by in July. Picking begins in late August or September.

Corn land is prepared in the same way as cotton land. Corn is planted, usually by hand but sometimes with a planter, in the deep furrows. Cultivations are made with siding plows in which the high middles are thrown to the corn as it grows, and other cultivations are made with hoe and spike-tooth cultivators. Cowpeas are often planted at the last working, and after the crops are gathered cattle and hogs are turned upon the fields. Crab grass is one of the most troublesome weeds and wild onion and nut grass give considerable trouble upon the heavier soils. Cover crops are seldom grown and all the cultivated land is allowed to lie bare during winter. Land for oats is plowed in the fall and harrowed. The seed is sown broadcast or in some cases with the drill. This crop is usually followed by cowpeas.

The cultivated fields in most cases extend close to the house and barn, leaving little room for yard or lot. The stumps have been removed from most of the land, with the exception of the recently cleared fields. Many of the tenant farms have almost no buildings, implements, or farm stock, but the average farm operated by the owner is fairly well equipped with tools and stock for the class of farming done. Comparatively few, however, have modern machinery and improved stock, and on most of the farms the work is done with one-horse implements. Tractors are used to some extent on the farms in the level Coastal Plain and terrace country.

For the most part the houses, barns, and other farm buildings are small, especially in the Sand Hill and Piedmont regions. The improvements in the level Coastal Plain and on the river terraces are better. Here many of the larger farms have their own cotton gins and a number have silos. The work stock consists mainly of mules, of which considerable numbers are brought in each season.

The 1920 census reports the average value of all farm property at $3,704[1] per farm, of which the land constitutes 63.2 per cent; buildings, 18 per cent; implements, 5.9 per cent; and domestic animals, 12.9 per cent. These figures will show a relatively small investment in buildings and equipment.

The rotation of crops is generally recognized to be of benefit, but under prevailing cropping systems it is not practicable. It is customary to plant cotton in the same field for an indefinite number of years, shifting sometimes to corn, but without system. Occasionally fields are allowed to lie fallow for one season. In many places corn is planted upon bottom land continuously. Cowpeas are quite commonly grown between corn rows and also follow oats the same season. Oats are sometimes planted between cotton rows. The only rotation in use, and that to a very limited extent, is cotton for two or three years, followed by corn, oats, and cowpeas. Even this rotation, if applied on a considerable acreage, would greatly improve farm conditions.

The amount of manure produced upon the farms is small, and this is applied to gardens and small patches of field crops. Green manuring is practiced to a small extent. According to the 1920 census, 95.1 per cent of the farms reported the use of commercial fertilizer at an average cost of $328.92 per farm. About four-fifths of this amount of fertilizer was used upon the cotton crop.

More than twice as much fertilizer was used in 1910 as in 1900, and the amount used has more than trebled during the last decade. Under normal conditions 8–2–2 to 8–4–4[2] grades of complete fertilizer are used.

The quantity of fertilizer applied varies widely. For cotton from 300 to 800 pounds per acre is used. Upon the lighter soils two applications are made, one-half at the time of planting and the rest about two weeks after chopping. Upon the heavier soils all is applied before planting. For corn from 100 to 500 pounds per acre are used, the applications being made under a modification of the Williamson plan, when corn is about knee-high and at the last working. Nitrate of soda is sometimes used as top dressing for corn at

[1] The census tabulates each tenancy as a farm. This has a marked influence in this result. On the basis of ownership the value would be much greater.

[2] Respective percentages of phosphoric acid, nitrogen, and potash.

last working, the rate of application ranging from 50 to 250 pounds per acre. Some farmers buy the ingredients, acid phosphate, cottonseed meal, and kainit and mix fertilizers to suit their particular requirements. Pine straw is often raked up and put on land, but systematic composting of waste materials is rare. Lime is used to a very small extent.

According to the 1920 census, 27.0 per cent of the farms reported the use of hired labor, with an average expenditure of $262.22 per farm. Farm labor is scarce and the price is high, $1.25 to $2 per day, or $25 to $30 per month, with house furnished. Cotton picking is paid for at the rate of 75 cents to $1 per 100 pounds. The labor available is only moderately efficient. On the smaller farms and tenant farms the owner or tenant, as the case may be, and their families perform the farm work, while on the larger farms operated by the owner the labor is performed by hired help.

In 1920 the census reported 61.2 per cent of the total area of the county in farms, with an average size of 71.9 acres, of which 34.4 acres was improved land; about 29.2 per cent of the total area of the county was improved land.

The size of land holdings varies greatly. Some of the larger holdings contain several thousand acres, little of which is improved land. On some of the large estates there are 50 or more tenants. In the upland many individual holdings contain 200 to 500 acres. The size of the tenant farms ranges from 25 to 50 acres, and that of the farms operated by owners from 50 to 250 acres. In 1920, 67.1 per cent of the farms were operated by tenants, the proportion remaining about the same during the last 20 years. The share system of renting prevails. The terms vary between wide limits according to conditions.

Under the most common form of land lease the owner furnishes land, seed, and fertilizer, while the tenant furnishes implements, stock, and labor, and the crop is divided equally. The farm operations are usually supervised by the owner. The tenant is usually allowed a garden patch and pasture for a cow and hog. In many cases the tenant pays a specified amount of lint cotton as rent, to be collected when the crop is ginned.

The tenants, as a rule, lack capital, and it is necessary for the owner to furnish implements and work stock in addition to seed and fertilizer. In this case the renter receives a smaller proportion of the crop. In 1919, according to the census figures, there were 1,702 colored tenants and 758 white tenants. Negro tenants form the majority in the level Coastal Plain, river terrace, and Piedmont sections, while white tenants predominate in the Sand Hill and other sandy sections.

The census value of farm land in 1920 was $32.59 per acre, or more than treble the value in 1910. The selling value of land in the Sand

Hill and rough Piedmont sections ranges from $10 to $35 an acre. The most desirable farm land is found upon the level Coastal Plain and on the river terraces in the general region south from Camden and from Camden to the river and on the west side in the vicinity of Lugoff. Values in this region range from $75 to $100 or more an acre.

SOILS.

Kershaw County lies upon the fall line between the Piedmont Plateau and the Coastal Plain. It is a region of varied geological formations and soil developments. The soils fall into three main groups or provinces: (1) the Piedmont Plateau province, where the soils are residual, divided into two groups, (*a*) crystalline region, (*b*) slate belt; (2) the Coastal Plain region, which is divided into three groups, (*a*) old Coastal Plain or Sand Hill region, (*b*) ancient river terrace or level Coastal Plain, corresponding to the upper pine belt, (*c*) the Red Hill region; (3) the River Terrace and Flood Plain province, embracing (*a*) old alluvial or terrace soils, (*b*) first-bottom recent alluvial, representing the present flood plain of the streams.

The Piedmont Plateau covers the northwestern fourth of the county. The soils have been derived from the weathering in place of the underlying consolidated rock formations. The lithological character of the rocks, the degree of weathering, and the amount of material removed all have considerable bearing upon the texture of the resultant soil type. The composition and drainage conditions, which have controlled the degree of oxidation or deoxidation, have been the determining factors in the color of the soil.

In the crystalline region, which lies to the north and west of a curving line passing from about 2½ miles west of Kershaw, along Little Flat Rock Creek, near Piedmont School, and striking the Wateree River near the mouth of Stillhouse Branch, the rocks are composed largely of coarse-grained granites and gneisses, containing a considerable amount of feldspar and known locally as "white granite." This is interrupted in places by areas of dark or gray granite which is less granular and contains less feldspar and more hornblende in proportion to quartz. This is cut by small dikes of diorite and other rock. These rocks are usually deeply weathered, but in places bowlders of granite are found upon and protruding from the surface. In places the rounded surface of the granite is exposed over areas several acres in extent. The most prominent of these are at Flatrock and Cedar Falls.

The slate region, which adjoins the crystalline region to the south, and from which it is separated by a clear-cut line, extends in a belt across the county. The southern and eastern boundary is rather irregular, owing to the dipping of the rocks beneath the Coastal Plain deposits, the edge of which is deeply serrated by stream valleys, ex-

posing the underlying slates along the hillside. The rocks belong to the Carolina slate formation, which is composed of light-gray to bluish-gray fine-grained clay and talc slates and schist. The belt is cut by dikes of diorite and other eruptive rocks. This formation in places carries numerous veins of white quartz, fragments of which appear upon the surface. The slate formation as a rule is not deeply weathered. The schist is deeply and thoroughly weathered, as are the dikes of diorite, except for the bowlders found here and there.

The Sand Hill region of the Coastal Plain province is a part of the sand-hill belt which extends from Alabama through the intervening States to Virginia. The northern part of the sand-hill belt in this county has a level to planelike topography upon the main drainage divides. From these divides spurs extend between the small drainage ways, and isolated areas are found capping the hilltops of the adjacent Piedmont country. This would seem to indicate that the sand plain was much more extensive at one time, and that much of the original deposit has been removed by erosion. The level remnant of this ancient sand plain extends well down into the county between the drainage ways, before the surface becomes broken, sand capping the higher points and unconsolidated sands and clays covering the lower slopes. The sand-hill belt extends to the southern limits of the county. It is the highest of the Coastal Plain formations. The material is sedimentary, representing deposits laid down at some former time, when this section was submerged in a sea or existed as a shore line of such a sea. The present variety in the character of the soils is probably more the result of the translocation of the finer material, erosion removing the sands and exposing the underlying heavier strata, and to wind action upon the shifting sands, than to differences in the original deposits. The more rolling area usually contains the finer material, while the depressions or flat areas are usually coarse in texture.

The Red Hill region is represented by comparatively small areas in this county, occurring between the edge of the Sand Hill section and the Wateree River and between the Piedmont Plateau and the level Coastal Plain. As the name implies, the soils of this region are red in color and have a generally hilly relief. They are derived from material coming largely from the Piedmont Plateau and deposited probably in fresh water under the influence of rapidly moving currents, judging by the quantity of waterworn gravel and cobbles throughout the entire deposit. The red color is due to the thorough oxidation of the soil material, which is high in iron-bearing minerals.

Lying between the Sand Hill region and the terraces along the Wateree River, south from the Red Hill region, is found an ancient

river terrace, which resembles the Upper Pine Belt of the Coastal Plain proper. A sharp break separates this region from the Sand Hills on the one side, and a well-defined line marks it in most places on the other, but in places there is no surface change and textural and structural differences in the material are the only means of delineation. This region has a fairly level to gently rolling topography and in every detail represents an ancient river terrace which has been subjected to many changes by erosion, leaching, and oxidation. It is composed of unconsolidated sands and clays derived from the Piedmont Plateau and Appalachian Mountains.

The River Flood Plain province includes both terraces or second-bottoms and first-bottom or overflow land. The terrace soils are developed mainly along the Wateree River below the entrance of Twentyfivemile Creek, and smaller developments are found upon Lynches River and other large streams in the Coastal Plain. As developed along the Wateree River, the material is derived largely from Piedmont soils and is predominantly fine in texture, while upon the smaller streams the material comes mostly from the Coastal Plain soils and is medium in texture. The terrace soils were deposited when the streams flowed at a higher level than at the present time, the general level of the terraces representing the overflow land of the streams at that time. Erosion, drainage, and oxidation have played an important part in the variations of the soils.

The first-bottom or overflow land is widely developed along the Wateree River below Camden and upon Lynches River, and is fairly well developed along the smaller streams in proportion to size. These soils have been deposited during floods and are composed of materials washed from the drainage basins of the various streams. The inherent qualities of the material and the drainage conditions and currents effecting the deposits are the principal factors, determining the character of the resultant bottom soils. The material deposited upon the overflow land of the Wateree River is derived largely from Piedmont soils, as is the material along the smaller streams that flow out of that region. Lynches and Little Lynches Rivers, Twentyfivemile Creek, and Granneys Quarter Creek have mixed Piedmont and Coastal Plain material, while along Swift, Big Pine Tree, and Spears Creeks the bottom-land soils are derived from Coastal Plain material, as is the case with the other smaller streams whose drainage basins lie in the Coastal Plain region.

The soils of these provinces are divided into series for convenience of classification, the soils of each series being similar in origin, mode of formation, occurrence, color, and general characteristics. The series is further divided into types, the unit of soil mapping, each type in the series representing a textural difference determined by the percentage of gravel, sand, silt, and clay in its composition.

The soils in the Piedmont province are classed with the Cecil, Appling, Georgeville, Alamance, Bradley, and Chesterfield series; those of the Coastal Plain with the Norfolk, Marlboro, Ruston, Orangeburg, Hoffman, and Portsmouth series; the terrace soils with the Amite, Cahaba, Kalmia, Myatt, and Leaf series; and those of the first bottoms in the Congaree, Wehadkee, and Johnston series.

The types in the Cecil series have gray or brownish-gray to red soils and heavy red subsoils. They are derived through weathering in place from granite, gneiss, and closely related crystalline rocks. The topography is rolling to hilly, the run-off rapid, and erosion active. The gravelly sandy loam and gravelly clay loam occur in this county.

The types of the Appling series have gray surface soils and yellow and red mottled friable subsoils. They are derived from granite and gneiss. The topography is more subdued than that of the Cecil. The soils are usually well drained, but erosion is not active. The sandy loam is the only type mapped in this county.

The Georgeville series includes types with gray or grayish-brown to reddish-brown soils and heavy red subsoils, compact and smooth, brittle when dry and plastic when wet. They are derived from clay and talc slates and schist of the Carolina slate formation. Thin platy fragments of slate and large angular fragments of white quartz are scattered upon the surface and through the soil mass. The topography is rolling to hilly, drainage well established, and erosion active. The Georgeville silt loam and silty clay loam are mapped in this area.

The types included in the Alamance series have gray to brownish-gray soils and a yellow subsoil of heavy texture. They are derived from gray slates, and fragments of slate and of white quartz are found upon the surface. The topography is gently undulating to level. Drainage is fairly well established. The Alamance silt loam is the only type mapped in this county.

The Bradley soils have gray to brownish-gray surface soils and heavy red subsoils. The surface soil is derived from Coastal Plain material and the subsoil from the Carolina slates. The topography is undulating to gently rolling, giving excellent drainage. The sandy loam is the only type of this series mapped.

The types of the Chesterfield series have gray surface soils and yellow, mottled with white and gray, heavy, brittle subsoils. The surface material is derived from Coastal Plain material, while the material forming the subsoil comes from slate rock and is similar to the Alamance subsoil. The topography is fairly level to gently sloping. The surface drainage is fairly well established, but the underdrainage is deficient. Only one type of the series, the coarse, sandy loam, is mapped in the present survey.

The types classified in the Norfolk series have gray soils overlying a yellow friable subsoil. The topography varies from fairly level to hilly. Drainage is well established and in the sandier types is excessive, the rainfall passing into the subdrainage. The organic content is low The Norfolk sand, including the sandhill phase, the coarse sand, including a loamy phase, and the sandy loam are mapped.

The Marlboro series comprises types with brownish-gray shallow sandy soils, underlain by a yellowish-brown sticky sandy clay subsoil, which in places becomes mottled with red in the lower part. The surface is fairly level to gently undulating and drainage is fairly well established. The sandy loam and fine sandy loam are represented in this area.

The types of the Ruston series have gray to brown surface soils and yellowish-brown to yellowish-red friable sandy clay subsoils. The surface is undulating to rolling and drainage is well established. Water-worn gravel occurs in many areas upon the surface and throughout the soil mass. Two types, the Ruston loamy coarse sand and sandy loam, are mapped.

The types included in the Orangeburg series have gray to brownish colored surface soils and a friable, deep-red subsoil. The surface is fairly level to rolling. Both surface and underdrainage are well established and aeration is thorough. The substratum normally contains beds of rounded quartz gravel. The sandy loam is the only type found in Kershaw County.

The soils of the Hoffman series have gray surface soils and a subsoil of mottled yellow, gray, pink, and red, compact sandy clay. They occur on low, rounded hills and slopes throughout the Sand Hill belt. The drainage is well established. The Hoffman sandy loam and coarse sandy loam are mapped in this county.

The Portsmouth soils are dark gray to black in the surface layer and gray mottled with drab, yellow, and brown in the subsoil. The soils occupy low, flat areas or depressions in the Coastal Plain and are poorly drained. The Portsmouth loam is the only type of this series in Kershaw County.

The Amite series includes types with brown to reddish-brown soils and red friable subsoils. They are derived from Piedmont and Coastal Plain material accumulated in well-drained terraces. The sandy loam is the only type mapped in the county.

The types of the Cahaba series have gray to brownish-gray surface soils and a yellowish-red to red friable subsoil. The surface is undulating and drainage well established. They occur as high, well-drained terraces and are derived from Piedmont and Coastal Plain material. The fine sandy loam is the only type found in this county.

The soils of the Kalmia series have gray surface soils and a yellow friable subsoil mottled with gray and red. The lower subsoil and substratum are tough and plastic. The surface is fairly level to gently undulating. Underdrainage is slow, but the surface is well drained. These soils occur as terraces along the larger streams, which have derived their material from the Coastal Plain. The sandy loam, fine sandy loam, and very fine sandy loam are represented in the present survey.

The types in the Myatt series have dark-gray to black surface soils and a gray mottled with drab, yellow, and brown plastic, sticky subsoils. They occupy low, flat terraces, having slow surface and under drainage. They are derived largely from Coastal Plain material. The fine sandy loam is the only type of the series mapped.

The types included in the Leaf series have dark-gray surface soils and a mottled gray, drab, yellow and red, heavy and plastic clay subsoil. They occupy low, poorly drained terraces. The materials are derived from Piedmont and Coastal Plain material. The silt loam is the only type mapped.

In the Congaree series have been grouped types with brown to reddish-brown soils and a light-brown subsoil in places mottled with drab, yellow, and brown. Both soil and subsoil contain fine particles of mica. These soils occupy first-bottom overflow land along streams which receive their drainage from Piedmont soils. The surface is level, with a few swells and depressions. The drainage ranges from poor to good. The types are subject to overflow. The silt loam, silty clay loam, and loamy fine sand occur in this county.

The Wehadkee series includes types with gray to brownish-gray surface soils and a mottled gray, drab, yellow, and brown heavy subsoil. The topography is level, except where varied by slight ridges and swales. The land is subject to overflow and the drainage is poor. This series occurs along streams that receive their drainage largely from the Carolina slates and to a small extent from the Coastal Plain. The silt loam and silty clay loam are mapped in the area.

The Johnston series is represented by dark-gray to black surface soils and a black to gray mottled with drab and brown sticky subsoil. The soil contains a high percentage of organic matter. The type occurs along streams that head in the Coastal Plain and has been developed under semiswampy conditions. The Johnston loam is the only type of this series mapped in Kershaw County.

The principal soils upon which agriculture is developed in Kershaw County are the Cecil gravelly sandy loam and gravelly clay loam in the crystalline section of the Piedmont; the Georgeville silt loam and silty clay loam in the slate belt; the Norfolk sand, coarse

sand, and sandy loam, and the Hoffman sandy loam in the Sand Hill section of the Coastal Plain; the Orangeburg sandy loam and Ruston sandy loam in the Red Hill section; the Marlboro sandy loam and fine sandy loam in the level Coastal Plain; the Amite sandy loam, Cahaba fine sandy loam, and Kalmia fine sandy loam on the terraces; and the Congaree silt loam on the first bottoms.

In the following chapters of this report a detailed description of each soil type is given and its relation to the agriculture of the county discussed. The distribution of the various soils is shown on the accompanying map, and the table below gives the name and the actual and relative extent of each type.

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk sand	94,336	34.0	Bradley sandy loam	6,848	1.4
Sandhill phase	71,232		Appling sandy loam	5,696	1.2
Cecil gravelly sandy loam	38,208	7.9	Kalmia fine sandy loam	4,480	.9
Norfolk sandy loam	37,184	7.6	Cahaba fine sandy loam	4,096	.8
Norfolk coarse sand	27,072	6.0	Alamance silt loam	4,032	.8
Loamy phase	1,728		Wehadkee silt loam	3,200	.7
Hoffman sandy loam	24,896	5.1	Orangeburg sandy loam	3,008	.6
Georgeville silty clay loam	21,568	4.4	Myatt fine sandy loam	2,304	.5
Georgeville silt loam	18,880	3.9	Kalmia very fine sandy loam	1,792	.4
Ruston sandy loam	18,176	3.7	Leaf silt loam	1,728	.4
Cecil gravelly clay loam	18,048	3.7	Portsmouth loam	1,472	.3
Johnston loam	13,440	2.8	Chesterfield coarse sandy loam	1,344	.3
Congaree silt loam	12,544	2.6	Ruston loamy coarse sand	1,280	.3
Congaree silty clay loam	12,544	2.6	Marlboro fine sandy loam	1,024	.2
Wehadkee silty clay loam	9,856	2.0	Amite sandy loam	640	.1
Hoffman coarse sandy loam	8,000	1.6	Congaree loamy fine sand	576	.1
Kalmia sandy loam	7,744	1.6			
Marlboro sandy loam	7,424	1.5	Total	486,400	

CECIL GRAVELLY SANDY LOAM.

The soil of the Cecil gravelly sandy loam is a light-brown to yellowish-brown gravelly sandy loam, fairly loose and open in structure, which passes at 7 to 12 inches below the surface into a red gravelly sandy clay. The subsoil is compact and contains enough mica to give it a greasy feel when pressed between the fingers. The gravel consists of angular fragments of quartz and feldspar. The subsoil also contains noticeable quantities of gravel.

This soil is not deeply weathered. At 3 to 10 feet below the surface, and in places at less depth, the partially decayed parent rock, a coarse-grained granite, is reached; in places the flat face of the granite rock is exposed upon the surface in areas of several acres, and in some areas numerous granite bowlders are scattered over the surface. Scattered spots are found over this type, commonly upon hilltops, where the land is locally called "white granite land."

In such areas there is a relatively large content of feldspar and the percentage of medium sand, which may be of Coastal Plain origin, is larger. The soil in these areas ranges a little deeper than over the type in general and there is a layer of yellowish-brown material, between the depths of 12 and 24 inches, over the typical red subsoil. These areas, however, are not extensive.

The Cecil gravelly sandy loam is derived from the weathering in place of coarse-grained granite. It is extensively developed in the northwestern part of the county, north and west of a line 2 miles west of Kershaw, following Little Flat Rock Creek to its mouth, thence to the Wateree River, near the mouth of Stillhouse Branch. Soil of this type covers about 75 per cent of the granitic area of the county. It has a hilly and broken relief, being cut by streams that reach to all parts of the upland. Small areas occur upon the main drainage divides where the topography is fairly smooth and a few of the slopes on the northwest side of the larger streams are gently sloping, but over the remainder of the type the hillsides are steep. In general, the run-off is rapid and erosion active. Extensive areas are severely gullied and are of little value for farming. Most of this soil shows evidence of having been under cultivation at one time. Abandoned fields are now grown up in old field pine. About one-third of the type, consisting of the more level ridge tops, along the main drainage divides and the more gently sloping hillsides or low sloping benches along the stream edges, is cleared and cultivated.

The original forest consists of a sturdy growth of shortleaf pine, white, red, and post oak, with a scattering growth of hickory, poplar, sweet gum, dogwood, and other hardwoods.

The Cecil gravelly sandy loam is not an important soil. Much of it is in large holdings and is farmed by tenants. Cotton is the most important crop. Small fields of corn, oats, and cowpeas and some patches of rye, clover, and sorghum are grown. Vegetables are produced for domestic use, and small home orchards of apples, peaches, and pears supply the home with fruit. Stock raising is of little importance and very little land is in pasture. Cotton ordinarily yields one-fourth to one-half bale per acre, giving three-fourths of a bale per acre or more in rare cases where carefully cultivated and heavily fertilized. Corn yields 15 to 25 bushels per acre. This land at one time was fairly productive, but through neglect and poor farming methods has been badly eroded. The land under cultivation at the present time is all terraced and contour plowing is followed, so that erosion has been checked to some extent. Single-draft plows and cultivators are used and the plowing is shallow, the cultural practices being much the same as upon the other sandy loam soils. This soil is easily handled and can be worked under a wide range of moisture conditions. Plowing usually is done the day following rain.

The Cecil gravelly sandy loam is deficient in organic matter. Commercial fertilizers are used to some extent, but not in such large amounts as on the sandier Coastal Plain soils. From 300 to 500 pounds of an 8–2–2 or 8–3–3 mixture per acre is applied to land intended for cotton. The available stable manure is used in growing corn and minor crops.

The selling price of this land varies considerably, depending upon improvements and extent to which the soil has suffered from erosion. The ordinary range is from $15 to $25 an acre. The rougher areas sell for $5 to $10 an acre, and some of the more favorably located land brings $50 to $75 an acre.

The Cecil gravelly sandy loam can be improved by deep plowing and the turning under of cover crops. These methods would deepen the soil, increase its fertility and moisture-holding capacity, and lessen surface washing. Cover crops should be grown to protect the surface during the winter season, and terraces should be maintained. The reclamation of the eroded areas present a problem that little effort is being made to solve.

CECIL GRAVELLY CLAY LOAM.

The soil of the Cecil gravelly clay loam is a light reddish brown to reddish-brown gravelly sandy loam to loam 2 to 5 inches deep. This passes abruptly into a red gravelly clay subsoil, granular in structure, fairly friable or crumbly when dry and plastic when wet. The clay contains a noticeable amount of mica, which gives it a greasy feel. The gravel content of the type consists of fine angular fragments of quartz. The per cent of gravel in the subsoil is much smaller than in the soil. This type is derived through weathering in place from dark-colored granite. In places bowlders of rock showing concentric weathering indicate that dikes of diabasic rock supply some of the materials entering into the composition of the soil. Weathering has taken place to a greater depth than in the case of the Cecil gravelly sandy loam. In most places it has reached a depth of 10 feet and in many a depth of 40 feet. Where dikes of harder rocks intrude the soil material is comparatively shallow. No bowlders of granite occur upon the surface of this type, which is one characteristic difference between it and the gravelly sandy loam type. The Cecil gravelly clay loam is scattered through the crystalline area of rocks. The largest areas are situated along the Lancaster County line in the vicinity of Stoneboro and Liberty Hill. Smaller areas lie along Flat Rock and Little Flat Rock Creeks and Beaver Creek.

The relief is more subdued than in the Cecil gravelly sandy loam areas; the ridge tops are flatter and the hillsides more gently sloping. The topography insures good surface drainage, while the internal drainage is thorough enough to give good aeration.

Although not very extensive, this is an important soil. Fully 75 or 80 per cent is cleared and cultivated. The original forest consists of a sturdy growth of shortleaf pine, with a scattering of oak, hickory, poplar, cedar, and dogwood, while much of the second growth consists of old field pine. Cotton, corn, and oats are the most important crops, the first-named occupying the largest acreage. Cowpeas and bur clover are grown in small fields. Alfalfa was noticed in several places. A few cattle are kept upon pastures, which usually include the rougher parts of the type. Cotton yields one-half to 1 bale per acre, according to season, fertilization, and culture; corn 15 to 25 bushels; and alfalfa 3 to 4 tons per season. Fairly good yields of cowpea hay are obtained. Commercial fertilizer is used, but not to such an extent as upon the sandier soils. From 200 to 400 pounds of an 8–3–3 mixture per acre is applied to cotton. The small supply of manure available is distributed in rows before bedding for cotton. Manure and small amounts of fertilizer are used in growing corn.

Practically all of this soil type under cultivation is terraced. The type is usually plowed and harrowed before the rows are laid off and beds made for seeding, but the plowing is too shallow for best results. It can be worked only under optimum moisture conditions, as it can not be plowed when too wet, and if allowed to dry becomes very hard, making plowing difficult.

This condition and the use of one-horse implements is responsible for the shallow plowing. Much of this soil has been under continued cultivation for many years with a consequent depletion of organic matter. The excellent drainage enables the soil to withstand a wet season, but crops suffer during a drought. This land sells for $25 to $75 an acre, with a few more favorably located places selling for higher prices.

For the improvement of this type it will be necessary to form a deeper soil. Deeper plowing with two-horse plows should be done gradually, so that a small amount of the subsoil be incorporated with the surface soil each year; cover crops should be planted to protect the surface during winter; and some of these should be turned under to increase the supply of organic matter. Lime could be used advantageously, following green manuring to improve the physical condition of the soil. It should be applied preferably before sowing a legume or grain crop, at the rate of 500 to 1,000 pounds per acre every four or five years.

The soil is adapted to corn, wheat, and oats, in growing which from 300 to 500 pounds per acre of acid phosphate should be applied. The soil is also fairly well suited to cotton, and alfalfa will succeed where the soil is properly prepared and inoculated and limed. The rougher areas should be kept in Bermuda grass pasture.

APPLING SANDY LOAM.

As developed in Kershaw County the Appling sandy loam covers wide stretches of fairly level to gently rolling country, which becomes broken only along the few streams that traverse the areas.

The soil consists of 6 or 8 inches of light-gray to gray loamy sand, passing into a layer of yellow friable sandy loam, forming a zone of transition between the soil and the subsoil proper, at 15 to 20 inches below the surface. The latter consists of a compact but friable yellow sandy clay mottled with streaks of red. Small areas lying on the crests of ridges have a sandy surface soil 20 to 24 inches deep, with rarely any yellow layer between the soil and subsoil.

The Appling sandy loam is derived chiefly from fine-grained gray granite, and is developed in a fairly extensive body between Liberty Hill and the Lancaster County line along the Stoneboro Road. The type is weathered deeply, and few bowlders appear on the surface.

The relief in general is smoother than in the other Piedmont soils, but owing to the sandy nature of the soil the drainage is good to excessive. The run-off is not great and erosion is less active than upon the other Piedmont soils. Small, shallow, intermittent drainage ways reach well back into the body of the type.

Some areas included with this type are of a distinctly gravelly nature. The surface soil is a gray gravelly sandy loam which passes at 6 to 10 inches into a yellowish-gray to yellow friable gravelly sandy loam, continuing for about 10 inches before passing into the subsoil proper, which consists of a mottled gray, yellow, and red gravelly sandy clay, fairly compact and impervious. The substratum is the same as the deep subsoil, except that it is more mottled with gray. The partly disintegrated parent rock is reached at depths of less than 10 feet and in many places at 4 to 5 feet. Very few bowlders appear upon the surface. The gravel content of the soil and subsoil consists very largely of angular quartz and feldspar, the grains usually not over one-fourth inch in diameter. The type is derived from the weathering in place of gray granite, which under ordinary circumstances gives rise to Cecil gravelly sandy loam, but owing to its position adjacent to and lying lower than the Norfolk coarse sand, it receives seepage water, which causes the mottled condition of the subsoil. The drainage of the type is otherwise well established, its position affording good surface drainage.

These gravelly areas are not very extensive. They lie along the contact of the crystalline area with the Norfolk coarse sand, which stands as a remnant of the sand plain once covering this section. They are prominently developed along the Flatrock road between Flatrock and the Lancaster County line. The surface in almost every area slopes gently toward the drainage ways.

The Appling sandy loam is nearly all cleared and under cultivation and is important in the agriculture of the section in which it is located. The original forest consists of shortleaf pine, oak, and a scattering of other hardwoods, with some scrub oak found upon the sandier places, while abandoned fields are covered with a thick growth of old field pine. Cotton is the most important crop and is grown on an acreage equal that of all other crops. Corn, oats, and cowpeas are of secondary importance, and alfalfa, sorghum, rye, sweet potatoes, and melons are grown in small patches. Home gardens contain most of the vegetables grown in this section. There are small orchards, consisting mostly of peaches, on many of the farms. Tobacco formed an important crop upon this land until a few years ago. Heavy yields of high-grade leaf were obtained with heavy fertilization, but distance from markets and low prices prevailing at the time caused abandonment of the industry.

Under normal conditions, when potash fertilizer can be economically applied, the yields of all crops on this soil are fairly good. During the shortage of potash brought about by the recent war the yields fell off appreciably. Formerly cotton yielded from one-half to 1 bale per acre, according to the seasons, amount of fertilizer used, and adequacy of the cultivation. Corn yields 20 to 30 bushels per acre and alfalfa 3 to 4 tons per season.

This soil is easily handled, requiring only light draft, and plowing and cultivating can be done within a relatively short time after rains. Cover crops are grown to a very small extent, and consequently very little vegetation is turned under and the supply of organic matter is low. Much of this soil is acid, judging by the abundant growth of sorrel in fallow fields. Very little lime is used, except in preparing for the planting of alfalfa. Manure is used upon small patches of special crops and gardens. Fertilizer is not applied as liberally as upon the sand land. From 300 to 600 pounds of an 8–3–3 mixture is used upon cotton and smaller amounts for corn. Nitrate of soda is applied in growing oats, corn, and cotton.

Owing to the distance from markets and railroads, this soil is not valued as high as its productiveness would otherwise warrant. It sells for $25 to $50 an acre. For the improvement of this soil the organic-matter content should be increased by turning under cover crops. The acid condition of the land should be corrected by the use of lime; more legumes, such as cowpeas, velvet beans, crimson clover, and vetch, should be grown, and complete fertilizer should be used for practically all crops.

GEORGEVILLE SILT LOAM.

The Georgeville silt loam consists of a layer of pale-yellow to brownish-yellow mellow silt loam, about 5 to 8 inches deep, which

passes to the subsoil through a transitional layer a few inches thick, composed of grayish-brown, changing with depth to reddish-brown, fairly compact silty clay loam.

The subsoil proper to 36 inches and deeper is a red to dull-red silty clay to clay, compact and brittle when dry and plastic when wet. The surface soil and subsoil contain small slate fragments, the proportion being less in the subsoil than the soil. Angular quartz fragments occur in more or less abundance on the surface and through the soil layer. The partly disintegrated slate is encountered at 3 to 6 feet below the surface.

The difference between this soil and the Alamance silt loam seems to be entirely one of drainage and aeration, the Georgeville having reached an advanced stage of oxidation. In places the surface material approaches a fine sandy loam. These areas are derived from a schist rock. Along the breaks and hillsides many spots appear where the surface soil has been partly or entirely removed, leaving the red clay exposed.

The Georgeville silt loam is derived through the weathering from rocks of the Carolina slate formation, parts of which contain some talcose slate and schist. Quartz veins are numerous.

This type is developed in the west-central part of the county, the largest areas being found in the vicinity of Cantey and northwest to White Oak Creek, on both sides of Sawneys Creek along the Fairfield County line, and around the headwaters of Beaverdam Branch. The topography is gently rolling to hilly or sloping. When developed in association with other types, as with the Georgeville silty clay loam, it occupies the tops of low rounded hills, while in the more extensive areas it occupies both the ridge tops and the slopes. The run-off is rapid, causing distinctive erosion. Underdrainage is fairly well established.

The type is not important in the agriculture of the county. Its total area is 18,880 acres, of which probably not more than 50 per cent is cleared and under cultivation. The virgin forest consists of shortleaf pine, oak, and a scattering of other hardwood trees. The second growth is largely old field pine. Cotton and corn are the chief crops; some oats, wheat, and cowpeas are grown and a considerable acreage is in pasture. Cotton yields one-fourth to one-third bale per acre, and corn 10 to 25 bushels per acre. There is a considerable area of waste land, many fields being idle; some because they are badly eroded and others from no apparent reason.

This soil is poorly farmed, much of it being operated by tenants. The cultural methods do not differ from those on the other Piedmont soils. Cover crops are not grown and green manuring is not practiced, with the result that the soil is deficient in organic matter. Plowing is usually shallow, care being taken not to turn up the red

clay subsoil, which in many cases has formed a hardpan or plowsole at the depth of plowing. No systematic rotation is followed, cotton or corn being planted for indefinite periods upon the sand fields, or alternated at irregular intervals. Winter oats sometimes follow cotton. Cowpeas may be planted after oats or between the corn rows at the last working. From 200 to 600 pounds of an 8–2–2 or 8–3–3 fertilizer is used for cotton. Smaller quantities are applied to the land intended for corn. The available manure is used upon corn land and the small patches in gardens or special crops. Land of this type sells for $15 to $30 an acre.

It would seem that the Georgeville silt loam could be used advantageously for stock raising. The steeper hills could be put in Bermuda grass pasture and the smoother areas used for general farm crops. More cover crops should be grown to protect the surface during the winter months, and turned under to increase the supply of organic matter. Lime should be used at the rate of 500 to 1,000 pounds per acre, which will improve the physical condition of the soil and prepare it for leguminous crops. If properly handled the type is fairly well suited to small grains. Phosphate fertilizer could be used to advantage with these crops. Terracing should be practiced over all this type.

GEORGEVILLE SILTY CLAY LOAM.

The soil of the Georgeville silty clay loam is a reddish-brown to red silty clay loam 4 to 6 inches deep. This layer passes into a subsoil of red silty clay, tough and compact in structure and smooth when pressed between the fingers. It is extremely brittle when dry and plastic when wet. Partly decomposed fragments of yellow and red slate are found upon the surface and throughout the soil profile. Angular fragments of white quartz are numerous upon the surface in places.

This soil is derived through the weathering in place of rocks of the Carolina slate belt. The partly disintegrated parent rock is encountered in many places within the 3-foot section, though in others they may not be encountered above a depth of 10 or 12 feet. The type is known locally as "slate land."

North from Hanging Rock Creek to the Lancaster County line, and east of Kershaw, areas were mapped as this type which more nearly represent Cecil clay loam. The soil here is derived from a fine-grained schist, mingled with slate and diabasic rock. These rocks are weathered deeply, ordinarily causing much of the rainfall to reach the surface channels. Nevertheless, erosion is not as destructive as might be expected, owing in some measure, it is thought, to the smoothness of the soil particles.

The Georgeville silty clay loam is a fairly important soil. From 60 to 70 per cent is cleared and under cultivation. The original forest is composed largely of shortleaf pine with a few oaks and a scattering of other hardwoods. Cotton, corn, and oats are the chief crops, cotton occupying the largest acreage. Oats are grown upon a larger acreage than upon any other of the upland residual soils. The corn acreage is relatively small, as the adjacent bottoms are used for this crop. Patches of wheat, cowpeas, and bur clover were noticed. Apple trees predominate in the home orchards. Vegetables are grown for home use. Some attention is given to cattle and hogs, a considerable acreage being in pasture, which includes some woodland and stony areas. Cotton yields an average of one-half bale per acre, with larger yields where the crop is heavily fertilized and properly cultivated. On the areas of deeply weathered soil, north from Hanging Rock Creek, yields as high as 1 bale per acre are reported. Corn and oats make fairly good yields. Apples seemingly do better than upon the sandy soils. The type furnishes fair pasture. Lespedeza volunteers in abandoned fields.

This land was cleared and put under cultivation early in the development of the county, so that a greater part of it has been tilled for many years, with the consequent depletion of the supply of organic matter. Plowing is usually shallow and disk harrows are used to some extent in the preparation of the seed bed. Terraces are maintained on practically all of the type under cultivation, reducing erosion to a minimum. The heavy nature of the soil and lack of organic matter make it hard to handle, and plowing can be performed only under favorable moisture conditions. Fertilizers are not used to as great an extent as upon the more sandy soils, but from 300 to 500 pounds per acre are applied in growing cotton.

The Georgeville silty clay loam sells for $25 to $100 an acre, according to location, improvements, and topography.

The first requisite for improvement of this type is to increase the supply of organic matter by keeping more stock and utilizing the manure and by growing and turning under cover and green-manure crops. Plowing should be gradually deepened to about 8 inches, using heavier draft disk plows and harrows. Applications of 1,000 pounds of burnt lime per acre every 4 or 5 years would improve the physical condition of the soil and should be practiced in conjunction with green manuring. Water evaporates rapidly from the surface of this land and a soil mulch should be formed by frequent cultivation to conserve the moisture. More leguminous crops should be grown; the type is fairly well suited to cowpeas, soy beans, and bur clover. Acid phosphate would be found to give good results with grains.

This land is well suited to stock raising and more attention should be given to this industry.

ALAMANCE SILT LOAM.

The Alamance silt loam consists of a pale-yellow to yellowish-brown floury silt loam about 6 to 7 inches deep, passing abruptly into a subsoil of yellow silty clay loam to smooth, compact silty clay, friable to brittle when dry and plastic when wet. A few white quartz fragments are scattered upon the surface, and in places they occur in large quantities, as upon knolls, where they may cover the ground thickly. Small platy fragments of gray slate are also scattered upon the surface and through the soil material. As a rule, weathering in this type has progressed to only shallow depths, the partially decomposed slate being encountered generally between 30 inches and 4 to 5 feet.

Some low spots occur in which the surface soil is a silty clay loam and the subsoil a yellow sticky clay resembling the Iredell subsoil in color and structure. In places there is an approach to the Georgeville, red mottling being found in the deep subsoil, and small areas of the silt loam of that series are included with the Alamance as mapped.

The Alamance silt loam is derived from the weathering in place of rocks of the Carolina slate formation under conditions of fair to poor drainage. The topography is fairly level or gently undulating to sloping. The type occurs upon the lower slopes along streams, around stream heads on low saddles between hills, and in rare cases upon knolls. It is developed over the north-central part of the county, where it is associated with the Georgeville soils.

The areas are small and irregular in shape, the largest being found south of Granneys Quarter Creek along Flatrock road, and west from Granneys Quarter Creek on the Liberty Hill road, with scattered areas along the Liberty Hill road and in the vicinity of Gaines Church and Cantey Hill School. The run-off is fairly good, but the underdrainage is retarded by the close structure of the subsoil. The type is also affected by seepage water from the higher surrounding types.

This soil is nonimportant, covering less than 7 square miles, with less than 30 per cent cleared and under cultivation. The forest growth consists chiefly of shortleaf pine, scrub or black pine, and oak, with a scattering of other hardwood trees. Cotton, corn, and oats are the leading crops, cotton being the most important. A considerable acreage is in pasture. Yields are low and uncertain.

The methods of farming are the same as upon the Georgeville silt loam. The type is deficient in organic matter and is difficult to

handle, owing to the tendency to clod. It is cold and warms up slowly in the spring and is in most places acid. Land of this type sells for $10 to $20 an acre.

Most of this soil could be utilized to the best advantage as pasture. Bermuda grass and native field grasses and lespedeza do fairly well. Artificial drainage followed by heavy applications of lime would correct the acid condition of the soil and improve its physical condition and green manuring would increase the productiveness. With proper handling small-grain crops would do fairly well.

BRADLEY SANDY LOAM.

The Bradley sandy loam, where typically developed, has a soil of light yellowish-brown loamy sand to light sandy loam, passing at 5 to 7 inches into a yellowish-brown friable sandy clay, which at 12 to 15 inches grades into the subsoil. The latter consists of a compact red clay, brittle when dry and plastic when wet. The surface soil is derived from Coastal Plain material, the waterworn pebbles that are often scattered over the surface giving proof of this derivation. The subsoil is derived in place from rocks of the Carolina slate formation and is essentially the same as the subsoil of the Georgeville soils. The partly decomposed parent rock in many places lies within the 3-foot profile and the first bedrock is most commonly 4 to 6 feet below the surface. In places angular fragments of white quartz are scattered upon the surface and distributed through the subsoil.

The Bradley sandy loam occurs along the edge of the Sand Hill country, where it borders the Carolina slates. It is developed upon gently sloping hillsides, low rounded ridge points, and upon low ridge spurs extending from the sand country into the Georgeville soils. Where the break from the Sand Hills to the slate belt is sharp the soil is not found. It is developed in the north-central part of the county and to some extent in the western part. The individual areas are not very large and are scattered. The topography is gently undulating to gently sloping. Both surface and underdrainage are well established.

Most of the Bradley sandy loam is cleared and cultivated. A part is covered with forest, consisting principally of shortleaf pine and scattering hardwood, including oak, hickory, and dogwood. While not extensive, this soil is fairly important. Cotton, corn, oats, and cowpeas are the principal crops, with cotton occupying by far the largest acreage. Small home orchards contain apples, peaches, and pears. This is a fairly strong soil, cotton yielding one-half to 1 bale per acre; corn, 20 to 40 bushels; and oats, 20 to 40 bushels. Fruits and berries yield well.

This soil is easy to handle, owing to the sandy nature of the surface soil. It holds moisture well, retains the fertilizer put upon it,

and is easy to build up. The methods used in farming are practically the same as on the other sandy loam soils. Commercial fertilizers are used for nearly all crops. Less fertilizer is needed to produce crops upon this land than upon the sandy land, but in many cases more is used, as there is little danger of loss from leaching. This soil is well suited to the staple crops grown, and to apples, grapes, and small fruits. Land of the Bradley sandy loam type is valued at $25 to $50 an acre.

Most of this land is deficient in organic matter, which can be best added by turning under cover and green manuring crops. The expense for nitrogenous fertilizers could be avoided by growing cowpeas, soy beans, vetch, and crimson clover, which are all fairly well suited to this soil. Small applications of lime would improve the physical condition of the soil, and could be used to advantage in conjunction with green manuring or the growing of the legumes.

CHESTERFIELD COARSE SANDY LOAM.

The soil of the Chesterfield coarse sandy loam is uniformly a light-gray incoherent coarse sand from 5 to 7 inches deep. This passes into layers of mottled gray, yellow, and brown friable sandy loam varying considerably in thickness, but usually ranging from 4 to 12 inches. The subsoil proper, immediately underlying, consists of a light-gray to white, mottled with gray, yellow, and brown, or a yellow mottled with white, drab, and brown, smooth silty clay loam. It is fairly compact and impervious. The surface and subsurface materials, which are derived from Coastal Plain deposits, contain a quantity of small rounded quartz gravel. The subsoil is derived from weathering in place of gray slate of the Carolina slate formation. This formation is weathered to an average depth of 4 to 5 feet, but in places the partly disintegrated slate is encountered within the 3-foot section. Small quantities of angular fragments of white quartz are scattered upon the surface and veins of this rock penetrate the subsoil. The subsoil is essentially the same as that of the Alamance silt loam, except that in the Chesterfield it is mottled, as a result of poor drainage and imperfect oxidation. This type is found along the contact of the Sand Hill country with the slate formation, the mantle of sand being deepest next to the Sand Hill section, and then running to a feather edge on the side of the slate belt. The most prominent areas of the Chesterfield coarse sandy loam are found north of Clyburn and northwest of Westville. They occur in fan-shaped areas covering several hundred acres. The topography is undulating to gently sloping, and the run-off is fairly complete, but the impervious nature of the subsoil checks the underdrainage and holds much of the seepage water that comes from the higher-lying adjacent soils.

Only 20 to 30 per cent of the area of this soil is cleared. The original forest consisted of shortleaf pine, a scattering of oak including post oak, and sweet gum. Much of the area is now covered with old field pine. Cotton yields one-fourth to one-third bale, and in good seasons one-half bale per acre, and oats 10 to 25 bushels, according to the season and the fertilizer applied.

Cotton and oats are the principal crops, the latter occupying the larger acreage. Idle fields having a thick growth of sorrel are numerous, and if left more than one season broom sedge comes in. Some of this land is in pasture, furnishing only fair grazing.

The same general farming methods are employed on the Chesterfield coarse sandy loam as upon the other sandy loam soils of the county. Fertilizers are used in small amounts. The value of this land is not very high. No single farm is composed entirely of it and it lowers the price of farms in which it is included.

For the improvement of this type the natural drainage ways should be deepened to carry off the seepage water, organic matter should be turned under to increase the moisture-holding capacity of the surface soil, and applications of lime made to correct the acidity.

The following table gives the results of mechanical analyses of samples of the soil, subsurface, and subsoil of the Chesterfield coarse sandy loam:

Mechanical analyses of Chesterfield coarse sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
243463	Soil	8.0	29.6	14.2	27.8	8.4	9.8	1.8
243464	Subsurface	5.2	19.7	9.8	24.5	9.6	25.5	5.7
243465	Subsoil	.9	1.9	8	7.7	12.4	68.6	7.9

NORFOLK COARSE SAND.

The Norfolk coarse sand consists of a gray to light-brown incoherent coarse sand, 6 to 8 inches deep, grading into a pale-yellow to yellow incoherent coarse sand extending to depths of 3 feet or more. The substratum encountered at 3 to 6 feet below the surface consists of a yellow coarse sandy clay, mottled in places with red. In many places the subsoil is noticeably loamy and tends to be slightly sticky when wet. The texture of the soil over much of the type ranges from medium to coarse, but spots occur in which the material is very coarse.

This soil, while not as extensive as the Norfolk sand, is widely distributed over the north-central part of the county, where it occupies the flattened ridge tops adjacent to the Piedmont region. In

the southwestern part of the county it occupies depressions or flat areas in the Sand Hill country.

The topography is fairly level to gently undulating, and only in a few places does it become strongly rolling. Practically all the drainage is subterranean, the rainfall passing downward through the sand so rapidly as to allow no run-off. The drainage in most cases is excessive, but the soil, owing to the nearness of the substratum, is not as leachy as the Norfolk sand or the sandhill phase of that type.

The Norfolk coarse sand is fairly important in the agriculture of the county; possibly 65 to 75 per cent of it is under cultivation. The tree growth consists of blackjack oak and longleaf pine.

The crops upon this type are diversified, cotton, corn, oats, rye, and cowpeas all occupying considerable acreages, while sweet potatoes, sorghum, and peanuts are grown in small patches on nearly every farm. Vegetables of various kinds are grown in home gardens and numbers of home orchards containing peaches, pears, plums, and grapes have been set out.

This type is farmed much better than the Norfolk sand, more manure and fertilizer being used and the yields being correspondingly higher. Cotton ordinarily yields one-half to three-fourths bale per acre, with 1 bale not uncommon in favorable seasons with careful cultivation. Corn returns 20 to 40 bushels per acre, the yield varying with quantity of fertilizer and the thoroughness of methods. Oats and rye give fairly good and sweet potatoes excellent yields. Peaches and grapes thrive and produce fruit of good quality.

The chief reason for the better development upon this soil than on many of the other soils is that the farms are small and operated mainly by the owners. In many cases the roads follow the sandy ridges, the homesteads being located upon this type and the farms extending back upon the Piedmont soils. This condition throws the intensive part of the farming upon this Norfolk soil. This type as found within the Sand Hill region is not so well farmed, but the yields compare favorably with those on the Norfolk sand.

Farming is more diversified upon this land than upon the Norfolk sand; more cover crops are grown and turned under and more manure is used. The cultural methods used in growing the main crops are essentially the same, but more improved machinery, such as sulky plows and cultivators, is used than upon any soil in the county, not excepting the level Coastal Plain and river terraces.

Commercial fertilizer is used extensively for nearly all crops. From 400 to 1,000 pounds per acre of 8–3–3 grade is applied to cotton and a smaller amount to corn land. About 100 pounds of nitrate of soda is used as top dressing for oats and as side dressing for corn

and cotton. Fertilizer for corn and cotton is applied half before planting and half to the growing crop.

This land in the best developed sections is valued at $40 to $60 an acre, but in the Sand Hill section $10 to $20 an acre is considered a fair price.

Over much of its area the Norfolk coarse sand is deficient in organic matter, and over the rest of it the supply could be increased advantageously, for which purpose recourse must be had to green manuring. More leguminous crops should be grown in the rotations. Cowpeas, velvet beans, and vetch do well, and crimson clover does fairly well upon this soil.

The abundance of sorrel in fallow fields indicates the need of lime, especially in growing the legumes. Melons and light truck crops are well suited to this soil. Certain fruits, especially peaches and grapes, give good results on this class of soil. Tobacco is grown upon the soil in other sections, and should succeed in this county in places where the clay substratum is not too far below the surface.

Norfolk coarse sand, loamy phase.—The Norfolk coarse sand, loamy phase, is composed of a light-brown to brown loamy coarse sand, fairly loose and open in structure, passing at 5 to 8 inches below the surface into a pale-yellow loamy coarse sand which in turn grades at 10 to 15 inches into a yellow to orange-yellow loamy coarse sand. The deep subsoil varies considerably, in places containing enough loam to be sticky and in others being lighter in texture than the soil. Small areas are found in which the sand is medium instead of coarse.

The type occurs as swales, oval-shaped depressions, low level areas, and benches throughout the central part of the Sand Hill region. Some of the larger areas are traversed by drainage ways, but many of the smaller depressions have no surface outlet, the surplus water escaping through subterranean channels. The topography is flat to gently sloping. The moisture-holding capacity of the soil is fairly good, owing both to the level or depression position and to the content of organic matter.

The Norfolk coarse sand, loamy phase, is of small extent, but is important, as it occurs throughout the Sand Hill region, where a soil of this nature is needed. Most of it is cleared and cultivated. The tree growth consists of a scattering of longleaf pine and a thick growth of turkey oak and forked-leaf blackjack oak, which grow larger than upon the sand hills, and a scattering of round-leaf blackjack in places. The forested areas normally support a heavy growth of wire grass. Cotton is the most important crop; some oats, corn, and cowpeas are grown, and small patches of rye, sorghum, forage corn, and sweet potatoes are planted. Vegetables are grown for home use in small gardens and a few peach and plum trees are found in home orchards.

Crop production varies according to rainfall and fertilizer used. During wet seasons the yields are low, owing to the fertilizer being leached from the soil. Crop yields, fertilizer practices, and general farming methods on the Norfolk coarse sand, loamy phase, are practically the same as on the typical soil, and the same general methods of handling this soil are followed as upon the other sandy soils. Corn is not planted in quite as deep a furrow as upon the Norfolk sand. The soil is easy to cultivate, requiring a light draft, and responds readily to fertilizers or improved treatment. This land sells for $20 to $65 an acre.

The Norfolk coarse sand, loamy phase, is rarely as deficient in organic matter as are the sandier soils, but an increased supply would improve yields. Liming would prove beneficial, as this soil is often acid. It is adapted to such legumes as cowpeas, soy beans, velvet beans, and vetch. These crops would furnish hay and increase the nitrogen content of the soil. It is also well suited to sweet potatoes, melons, and to practically all the vegetables grown in this section. Peaches do exceptionally well. Complete fertilizer should be used with the main crops.

NORFOLK SAND.

The Norfolk sand consists of a gray to brownish-gray loose sand, about 5 or 6 inches in depth, which passes into a pale-yellow medium or coarse loose sand, usually 4 to 10 feet deep, resting upon a yellow sandy clay in many places mottled with red. There are included patches of coarse sand usually upon the breaks or in swales. The subsoil in spots becomes slightly loamy, having a bright-yellow or orange color. Under forest conditions the surface soil is somewhat darker than in cultivated fields.

The Norfolk sand is extensively developed over the eastern two-thirds of the county and in the southwestern part. It occurs upon the somewhat flattened ridge tops of the Sand Hill region and upon the more gently sloping breaks. In places along the main drainage divides it occupies fairly extensive flats, which seem to represent the remnant of an extensive sand plain that at one time formed the entire surface of this section. In the southeastern part of the county small detached areas are numerous.

The surface is fairly level or gently undulating to moderately rolling. The run-off amounts to very little and erosion is not active. The internal drainage is excessive, the water passing rapidly downward through the incoherent sand and finding its way out through subterranean channels. Numerous streams head along the edge of the type.

The Norfolk sand is not a strong soil, but is fairly important, as it forms an extensive acreage of cultivated land. About 60 or 70 per

cent of the type is cleared and under cultivation. The tree growth consists of oaks, with a scattering of longleaf pine. The oaks are chiefly of the forked-leaf blackjack, turkey, and Spanish varieties. They attain a slightly larger size than upon the sandhill phase of the type. A scanty growth of wire grass occurs in the forested areas. In fallow fields there is a thick growth of sorrel, indicating acid condition. The soil is porous and droughty. Fertilizers leach out readily during rainy seasons, and crops fire during dry spells.

Cotton is the most important crop, but small fields of corn, oats, and cowpeas are grown on nearly every farm. Cowpeas may be planted between corn rows and harvested as seed or sown broadcast and used for making hay. Sorghum, rye, and peanuts are planted in small patches. Sweet potatoes are produced in abundance, but very few are marketed. Nearly every farm has a vegetable garden. Small home orchards containing peaches, pears, and plums are numerous, and a few fair-sized peach orchards were noticed, but commercial orcharding has not developed. Muscadine grapes flourish. Little or no stock is raised, owing to the scarcity of grass.

The crop yields are not very large. Cotton yields one-third to one-half bale per acre, but with heavy fertilization three-fourths to 1 bale can be produced in good seasons. Corn yields 10 to 30 bushels per acre, according to fertilizer, manure, methods used, and season. The yields of other crops, except sweet potatoes, which yield 50 to 250 bushels per acre, are only fair.

Garden vegetables do well where heavily manured and fertilized. Such fruits as peaches, plums, and grapes make healthy growth and furnish a good grade of fruit. Small fruits and berries do fairly well where properly cared for.

Crops are rarely grown on this soil without the use of fertilizers. Applications range from 300 to 800 pounds for cotton, with lesser amounts for corn and other crops. Fertilizer is commonly added in two applications, one-half at the time of planting and one-half as a side dressing to the growing crop. The small amount of manure available is placed in the rows before bedding and is used either for field or garden crops.

The results upon this type depend largely upon the season; during wet spells the fertilizer leaches away and is lost, while in excessively dry seasons the crops have a tendency to burn out, or french.

Cotton is planted on beds and corn in deep furrows. Plowing requires only light draft. Little working of the soil is needed before bedding.

The selling price of this land varies considerably with location and improvements, the price ranging from $15 to $50 an acre. The land of this type is deficient in organic matter even in its forest state, owing to the rapidity with which this constituent burns out.

The turning under of cover crops and the stubble of leguminous crops tends to increase the supply. This is important in soil of this character, not only as increasing the store of plant food, especially nitrogen, but also as influencing the power of the soil to hold moisture.

Certain legumes, among them cowpeas, velvet beans, and vetch, do well on the type and should be grown more extensively. The soil needs complete fertilizers to produce satisfactory crops, but heavy applications at one time are not recommended. The safer plan is to apply in several applications. This land is deficient in lime and this should be supplied where leguminous crops are to be grown.

This land is well suited to peaches, grapes, and dewberries. Extensive commercial orchards and vineyards are located upon the type in adjacent territory, where the climatic conditions are much the same.

Norfolk sand, sandhill phase.—The sandhill phase of the Norfolk sand is essentially the same as the Norfolk sand in point of texture, color, and structure, but differs in having a more rolling topography and a deeper sand substratum.

A number of variations occur in the type. The depth to the underlying clay varies from about 5 to 25 feet, with an average of about 10 feet, considerable differences occurring within short distances. In places along the break of the hills, material similar to that forming the subsoil of the Hoffman soils is exposed by erosion. Upon these spots fragments of ferruginous sandstone and iron concretions are common and rounded quartz gravel is scattered upon the surface. The sand content of much of the type is largely of medium grade, but some areas of coarse sand that have the characteristic sandhill topography are included. Upon many of the ridges the subsoil is yellow to orange in color, shows the presence of finer material, and is more thoroughly aerated. Swales, in which the soil becomes somewhat loamy and has a brownish color, are numerous, but these areas are small and no attempt was made to show them on the soil map.

The Norfolk sand, sandhill phase, is extensively developed in the Sand Hill region. The largest areas lie between Lynches and Little Lynches Rivers, north from Bethune to Buffalo Creek, and on the south side of Little Lynches River as far up as the crossing of the Lockart road, and extending to the headwaters of the streams that flow to the west. Other considerable though smaller areas lie between these large areas and the Wateree River. West of this stream the phase is prominently developed south from the Seaboard Air Line Railway to the Richland County line.

The large areas upon the divides are of rolling topography, becoming more broken next to the valleys of the larger streams and in belts where the smaller streams have cut back into the upland. The detached areas usually lie along the slopes to the streams.

Although the drainage is excessive the run-off is small, practically all the rainfall finding its way into the subdrainage and appearing as the source of the numerous streams that head along the edge of the sand hills.

The forest growth consists of blackjack oak, with a scattering of longleaf pine. The pine was plentiful at one time, but most of it has been removed for lumber. Where the clay comes closer to the surface, trees make a larger growth. Here there was more longleaf pine in the original forest. The land supports little or no undergrowth and very little grass.

Only a small percentage of this phase is cleared and used for farming and it can not be considered an important soil. It is only within the last few years that any attempt has been made to farm it. The supply of organic matter is very small and the soil has little power to retain moisture. It is easily tilled and is one of the earliest soils in the county. The same crops are grown as on the typical soil and in about the same relative proportion. The yields are usually light, unless heavily manured or fertilized, and even then the season must be favorable.

Land of this phase ordinarily sells for $5 to $15 an acre; a few more favorably situated areas bring $20 to $30 an acre.

NORFOLK SANDY LOAM.

The soil of the Norfolk sandy loam is a loose and incoherent yellowish-brown sand to loamy sand about 4 to 6 inches deep. This passes into a layer of pale-yellow loamy sand to light sandy loam which extends to 15 to 18 inches, which in turn grades into a yellow friable sandy clay, extending to a depth of 3 feet or more. The substratum in most places is mottled with red, gray, and white at depths below 4 or 5 feet.

The Norfolk sandy loam is formed under three conditions in this area: (1) It is developed upon the fairly level ridge tops in extensive areas. Here the topography is fairly level to gently undulating and compares favorably with this soil as encountered over the smooth Coastal Plain country. Such areas are prominently developed south and east of Paint Hill, west of Bethune, and north and west of Camden. West of the Wateree River similar areas occur upon the flat ridge-tops north of Twentyfivemile Creek. (2) It occurs upon the low hills, hillsides, and lower slopes of the Sand Hill region, where it approaches in topography the rolling phase of the type, though not sufficiently rolling to be classed as that phase. The surface is lighter gray than the average and the sand ranges a little deeper—from 20 to 30 inches. Spots of Norfolk sand in which the sand reaches a depth of 3 feet or more are included, together with small areas of the Ruston and Hoffman sandy loams. Erosion has

been active in places, and terracing should be employed as a corrective measure. (3) It occurs as depressions throughout the Sand Hill region. The topography of such areas is fairly level, but the drainage conditions are not characteristic of the Norfolk sandy loam, being almost entirely internal. The surface is darker in color and the deep subsoil in places is mottled with red.

In point of area these three variations are about equal in extent, and aside from the difference of topographic position they have all the characteristics of the Norfolk sandy loam. Some areas of coarse sandy loam are included with the type, particularly in the vicinity of Bethune and along the border of the crystalline region. The drainage of most of the type is thorough. The underdrainage is well established and the conditions favorable for aeration.

The Norfolk sandy loam is one of the most important soils in the county; from 75 to 80 per cent is cleared and under cultivation. Most of the uncleared areas are in the more rolling section. The forest growth consists chiefly of longleaf pine, with a scattering of oak and dogwood. In the more rolling areas considerable round-leaf blackjack oak occurs. In most of the forested areas there is a thick growth of wire grass. The Norfolk sandy loam is ordinarily deficient in organic matter. It holds moisture fairly well, crops suffering only during prolonged dry spells.

Nearly all the crops grown on the upland are found upon this land. Cotton is the leading crop, occupying an acreage equal to that of all other crops combined. Corn is next in acreage and importance. Oats and cowpeas are grown to some extent. Other crops, such as wheat, vetch, rye, sorghum, and sweet potatoes, are of minor importance. Irish potatoes and other vegetables are grown in most gardens for home use, and small orchards, in which peaches predominate, are found upon most farms. A number of small pecan groves have been set out. Little attention is given to stock raising.

Cotton yields one-half to 1 bale per acre, corn 20 to 45 bushels, and oats about 15 to 45 bushels, depending upon the season and the quantity of fertilizer applied. Cowpeas and crab grass return about $2\frac{1}{2}$ to 3 tons of hay per acre. The more level areas include some of the best farm lands in the county, with yields above the average, while the yields on the rolling areas fall below.

Upon the best farms the fields are plowed and harrowed before the beds are thrown up and the rows marked out. Upon some farms the rows are laid out and bedded without any previous preparation. Cotton is planted upon beds, corn in deep furrows, and oats usually broadcast. Cowpeas are planted in corn at the last working and harvested for seed, or are sown broadcast after oats and cut for hay. Systematic rotations are not followed, fields being kept continuously in one crop or changed from cotton to corn and vice versa at irregular intervals.

The land is left in stubble during winter, with the exception of the acreage in oats, which forms a relatively small proportion of the cultivated area. Little attention is given to turning under crops or otherwise increasing the organic-matter content. Two-horse implements are used by the best farmers, but most of the plowing and crop cultivation are made with one-horse implements, and the tenants use one-horse plows almost exclusively.

As a rule, heavy applications of fertilizer are made, from 400 to 1,000 pounds per acre of 8–2–2 to 8–4–4 grades being used on cotton. When the larger amounts are applied, half is usually added before planting and the rest about two weeks after chopping. Applications for corn are about half as large as for cotton—one-third before planting, one-third when the corn is about knee-high, and the rest at the last working. About 75 to 100 pounds of nitrate of soda is used as a side dressing on corn and cotton. No fertilizer is applied to oats before planting, but a heavy application of nitrate of soda is made in the spring. The small amount of manure available is used mainly upon the gardens and for special crops. If applied to cotton it is mixed in the trench before bedding.

The better areas of the Norfolk sandy loam sell for $75 to $100 or more an acre. The more rolling areas sell for $25 to $35 an acre, and where well improved for $40 to $50.

The content of organic matter in this soil must be increased to give the best results. This would not only increase the power of the soil to hold moisture, but also make the fertilizer applied more effective. Small quantities of lime could be used advantageously where cover crops have been turned under. Oats, wheat, or rye will serve as winter cover crops, while such legumes as crimson clover, cowpeas, velvet beans, and vetch will make good summer crops for adding organic matter to the soil. These crops may be grown for hay and only the stubble turned under, or the active crop may be plowed down. In either case the legumes add much nitrogen to the soil. Complete fertilizer should be used upon this land, but where legumes are grown the proportion of nitrogen in the mixtures applied to the following crop may be decreased.

This soil is adapted to a wide range of general and special crops. It is a good cotton and corn soil and is well suited to the legumes mentioned above. Truck crops of many kinds and tobacco are grown successfully upon this soil in other sections of the State and in the Coastal Plain in general.

MARLBORO SANDY LOAM.

The Marlboro sandy loam consists of a pale-yellow to yellowish-brown mellow loamy sand to light sandy loam, 5 to 12 inches deep,

with an average of about 8 inches, grading immediately into a subsoil of yellowish-brown sandy clay, not very compact, crumbly when dry, and somewhat sticky when wet, having a decided tendency to gum or roll upon the auger. Upon the breaks or stream edges, where the surface material has been thinned by erosion, the soil is shallow and has a brownish to reddish appearance. The subsoil in these places is distinctly red or yellowish red, ranging toward the Ruston subsoil in color, though retaining the structural characteristics of the Marlboro.

In places, noticeably near Ellerbee and at Camden, the surface soil is gray and slightly deeper than in the typical development. The subsoil is yellow, shading toward the Norfolk color, and the deep subsoil is in places mottled with red, which is a characteristic of the substratum over most of the type. This red mottling occurs where the soil is associated with soils of the Hoffman series.

The largest area of the Marlboro sandy loam lies in the vicinity of Canteys Lane. This area has an extent of approximately 5 square miles. Important areas are developed in the vicinity of Ellerbee, southeast of Camden, and in the city of Camden itself. Smaller areas lie about one-half mile north of Lugoff and northeast of Antioch Church at the Lee County line.

The Marlboro sandy loam occupies an old river terrace, which has about the same level and the same appearance and which is probably of about the same age as the upper pine belt of the Coastal Plain.[3] This terrace lies 25 to 50 feet above the present river terraces. The surface is that of a plain, slightly dissected by numerous streams, giving in detail a decidedly undulating topography.

The type is well but not excessively drained. The capacity of the soil for moisture is high, and crops do not suffer badly from drought, even in dry seasons. Erosion is not active to the extent that terracing is needed.

The Marlboro sandy loam is one of the most important soils in the area. Practically all of it is cleared and under cultivation. The condition of this soil was favorable to the development of the early agriculture, and many of the large plantations were located upon it. The leading crops at present are cotton, corn, oats, and cowpeas, cotton covering an acreage as great as that of all other crops combined. Oats are grown more extensively than upon the other upland soils. Irish and sweet potatoes and vegetables are grown in small patches and in gardens. There are farm orchards, in which peach trees predominate.

Most of the grain and hay grown on this soil is utilized to feed work stock, but some is used to fatten cattle and hogs that are pastured upon other soil types.

[3] See Geology of South Carolina.

Cotton ordinarily yields three-fourths to 1¼ bales per acre, with an average of about 1 bale, corn 25 to 50 bushels, and oats 25 to 50 bushels.

Cowpeas give a heavy cutting of hay. The yields upon this soil vary with the conditions of the soil, the thoroughness of cultivation, and the quantity of fertilizer used. Climatic conditions probably have less influence than upon any other soil in the area.

A relatively large proportion of this soil is farmed by the owners and many of the best farms in the county are located upon it. The use of two-horse implements and improved labor-saving farm machinery is not uncommon. Most of the land is plowed broadcast, harrowed, and the rows laid off and bedded later. Cotton is planted on beds and corn in shallow furrows, the cultivation being more nearly level than upon the sandier soils. Cowpeas, as on the sandy soils, are either planted between the corn rows at the last working or are sown broadcast on the land from which oats have been harvested. The cotton and corn fields are left bare during the winter, except where oats are sown between the cotton rows—a practice not common. No definite system of crop rotation is followed. Cotton and corn are sometimes alternated, but crops are often grown for indefinite periods upon the same land.

From 400 to 800 pounds of high-grade fertilizer mixtures are used for cotton and smaller quantities for other crops. About 100 pounds per acre of nitrate of soda is used as a top dressing on oats and as side dressing for corn and to some extent for cotton. The methods of applying fertilizers vary considerably, but most farmers add half the fertilizer just before planting and half while the crop is growing. Most of the available manure is used on cotton and corn, being applied in the rows before bedding.

The Marlboro sandy loam is held at higher prices than any other soil in the county. Most of it will bring $100 or more an acre. Very little is offered for sale. This type is well suited to the production of cotton, corn, and oats, and fairly well to the growing of legumes and grasses.

Upon a highly productive soil like this more intensive farming should be practiced. A systematic crop rotation should be adopted, making cotton the surplus crop and providing for the production of all the food and feed crops necessary to the maintenance of the farm. More leguminous crops should be grown. This would increase the supply of hay and lessen the expenditure for nitrogenous fertilizers. Cover crops should be grown to protect the soil during winter and turned under to increase the supply of organic matter in the soil. In connection with this practice, small quantities of lime could be used advantageously. The use of labor-saving implements could well be extended.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Marlboro sandy loam:

Mechanical analyses of Marlboro sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
243422	Soil	7.2	15.8	6.5	23.1	25.4	16.8	4.8
243423	Subsoil	2.0	7.9	3.4	14.8	18.1	23.1	30.6

MARLBORO FINE SANDY LOAM.

The Marlboro fine sandy loam is a gray to brownish-gray loamy fine sand, 7 to 10 inches deep, which passes through a transition zone of a few inches of light fine sandy loam into a yellow to yellowish-brown fine sandy clay subsoil, fairly compact and friable when dry and sticky when wet.

Some variation from this description occurs. On some of the steeper slopes the surface soil is thin and has a reddish-brown cast, and the subsoil is reddish yellow and becomes redder with depth, the color approaching that of the Ruston subsoil. A few spots or slight depressions where the drainage is not so well established have dark-gray surface soils and the deep subsoil is mottled with red.

The Marlboro fine sandy loam occurs in the same general belt as the typical Marlboro sandy loam. It occupies a part of an ancient terracelike area lying between the Sand Hills and the lower terrace land along the river. It is developed in a strip about one-half mile wide, beginning where the Southern Railroad crosses Swift Creek and extending to the Sumter County line. The topography is fairly level to gently undulating, the surface being cut by numerous shallow streamways. Surface drainage is good and underdrainage thorough, except in local spots. The capacity of this soil for moisture is relatively high.

The Marlboro fine sandy loam, though not extensive, is important in the agriculture of the county. About 95 per cent of it is cleared and under cultivation. It is a strong soil with yields in general about the same as on the sandy loam of the series, except in the case of oats which give slightly larger returns.

The farming conditions and practices and the fertilizer differ little on the two soils. The selling price of this land ranges from $75 to $100 or more an acre. Very little of it is offered for sale.

For the improvement of this soil the same methods are recommended as for the Marlboro sandy loam.

Results of mechanical analyses of samples of the soil and subsoil follow:

Mechanical analyses of Marlboro fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
243424	Soil	0.6	2.5	2.6	29.2	34.3	24.6	5.2
243425	Subsoil	1.2	3.5	2.2	23.0	23.2	17.4	29.7

RUSTON LOAMY COARSE SAND.

The Ruston loamy coarse sand has a soil about 8 to 10 inches deep, consisting of a brown to reddish-brown loamy coarse sand, which passes gradually into a subsoil of reddish-brown fairly heavy loamy coarse sand extending to depths of 3 feet or more. In many places the lower portion of the soil profile becomes lighter brown in color and is lighter in texture. Small areas are included in which the sand content is medium in texture.

This type occurs as low, flat areas or swales scattered through the Sand Hill region, being more prominently developed near the boundaries of the region, where the sand mantle becomes thinner and is underlain by red clay.

The largest area, containing somewhat less than 1 square mile, is located 2 miles northwest of Camden. Other smaller areas are developed in this vicinity. The surface is fairly level or gently undulating to gently sloping. The drainage is largely internal, but is ample to remove all surplus water.

Only 2 square miles of this type of soil occurs in the county. This is nearly all under cultivation. Cotton, the principal crop, yields from one-half to 1 bale per acre. The small extent of the type renders further discussion unnecessary.

RUSTON SANDY LOAM.

The Ruston sandy loam in Kershaw County is usually associated with the Norfolk and Hoffman soils of the Sand Hill region or the Orangeburg soils of the Red Hill region. It is composed of three layers—a surface layer of gray loamy sand soil 6 to 8 inches deep, a subsurface layer of yellow heavy sandy loam to sandy clay 4 to 6 inches thick, and a subsoil layer consisting of yellowish-red friable sandy clay, moderately compact, extending to a depth of 3 feet or more. The substratum is normally mottled with red and yellow.

Some gravelly areas are associated with this soil, the gravel consisting of rounded quartz fragments, varying in diameter from one-half to 2 inches and averaging less than 1 inch. Such areas are most numerous around the margins of the type and along the slopes. Small areas of coarse sandy loam also are included with this soil,

In some places in the Sand Hills the sandy surface soil of this type is 10 to 15 inches deep. Another variation occurs in the narrow strips of this soil mapped along the outer edge of the level Coastal Plain next to the Marlboro soils. It is found in three separate areas—one south of the Seaboard Air Line Railway bridge to the cemetery south of Camden, another north of Canteys Lane, and another at Boykin Mill. The soil here is a grayish-brown loamy sand to sandy loam, 6 to 10 inches deep, grading into a yellowish-red to dull-red friable sandy clay extending to a depth of 3 feet or more. The color of the substratum in general is the same as that of the deep subsoil, but in places is redder and contains beds of gravel.

The largest and most typical development of the Ruston sandy loam is in the Red Hill region. The largest areas are situated north from Twentyfivemile Creek to the hilltops in the vicinity of Rabon Crossroads.

The Ruston sandy loam is well drained throughout its entire area. The surface run-off is well established, and the character of the substratum affords good underdrainage and aeration. The soil has good moisture-holding capacity. The topography is gently undulating to strongly rolling, with fairly steep slopes along the outer or stream-bluff margin. This is one of the important soils in the county, and nearly all of it is cleared and devoted to farming. The uncleared areas represent patches of longleaf pine, with a scattering of hardwood trees. Cotton is by far the most important crop, with corn, oats, and cowpeas occupying a fair acreage. Wheat, rye, sorghum, and clover are minor field crops. Sweet potatoes and vegetables for home use are grown in patches upon practically every farm. A few small orchards occur in which peaches predominate. Dairying is developed upon this soil near Camden, the cows being grazed upon the river-bottom land. Cotton yields one-half to 1 bale, corn 20 to 45 bushels, and oats 30 to 50 bushels per acre. Wheat gives fairly good returns and cowpeas, vetch, and crimson clover give satisfactory yields of hay. Commercial fertilizer of 8–2–2 to 8–4–4 grades is applied at the rate of 300 to 800 pounds per acre for cotton and in smaller amounts for corn. About 100 pounds per acre of nitrate of soda is used as side dressing for cotton and corn and slightly larger amounts as top dressing for oats in the spring. The same methods of cultivation are followed as upon the Norfolk sandy loam and other sandy loam types, and the methods suggested for the improvement of the Norfolk sandy loam apply equally well to this soil. This type is valued at $75 to $100 an acre, according to state of improvement and location.

ORANGEBURG SANDY LOAM.

The Orangeburg sandy loam consists of light-brown to yellowish-brown loamy sand 8 to 12 inches deep, grading through layers of

reddish-brown to red sandy loam a few inches thick into dull-red friable sandy clay which extends to a depth of 3 feet or more. The substratum, to a depth of 10 to 20 feet, which includes the entire deposit, is essentially the same as the subsoil, except that it contains beds of waterworn quartz gravel and cobblestones.

A few variations occur in the surface soil. In places it ranges from gray to brownish gray in color, and upon slopes where the soil is thin it has a reddish cast. In such positions a few spots occur in which the subsoil has been exposed by erosion. The subsoil is fairly uniform in color and texture throughout the different areas.

This soil is found capping the hills along the boundary between the Piedmont Plateau and the level Coastal Plain, where it stands as a remnant of what seems to have been at one time an extensive formation. The largest areas lie in the vicinity of Knights Hill. A fair-sized area is located 2½ miles southwest of Kershaw just south of Hanging Rock Creek. Smaller areas occur near the Fairfield County line, skirting the edge of the Sand Hill and level Coastal Plain regions.

The topography of this soil is fairly level to gently rolling, and in a few places the slopes are steep enough to cause erosion. All the type is well drained. The moisture-holding capacity is good.

Although not very extensive, the Orangeburg sandy loam is among the more important farming soils. It is nearly all under cultivation. The existing forest consists of longleaf pine and a scattering of hardwood trees. Cotton is the most important crop, but a considerable acreage is planted to corn, oats, and cowpeas. Several patches of bur clover, vetch, and alfalfa were noticed. Many small orchards containing peaches, apples, and plums are located upon this type. Cotton ordinarily yields one-half to 1 bale per acre, with higher yields on the best farms. Corn yields 20 to 45 bushels per acre, oats 20 to 35 bushels, and peavine hay 1 to 2 tons.

The general methods of handling this soil, including cultivation and fertilizer practices, are essentially the same as upon the Norfolk sandy loam and other sandy loam soils. Very little of this land is protected by cover crops, and little organic matter is turned under. Most of the steeper slopes that are cultivated are terraced.

The market value of this soil is not as high as its productive power would warrant. The price ranges from $35 to $45 an acre, with some areas favorably situated held as high as $100 an acre.

Cover crops should be grown to protect the surface of the soil in winter. Where the slope is steep it should be terraced, and the steeper parts, where erosion is active, should be put in Bermuda-grass pasture. Some of the cover crops should be turned under to increase the organic matter in the soil. More legumes should be grown, as this would lessen the amount of nitrogen fertilizer needed for crop

production. Small amounts of lime should be used preceding leguminous crops. The use of phosphoric fertilizers is recommended with grain crops.

Steps for improving this soil should include the growing of cover crops and legumes and the use of lime where necessary. This soil is one of the best cotton soils in the State, and heavy yields are obtained in other sections. Cotton should be made a surplus crop, as the land is also well adapted to the production of other general farm crops and is capable of producing good yields of both food and feed crops. Peaches and pecans are grown upon a commercial scale on this soil in other parts of the South.

HOFFMAN COARSE SANDY LOAM.

The Hoffman coarse sandy loam consists of three layers: A gray rather incoherent coarse sand 5 to 7 inches deep; a subsurface layer of yellow or grayish-yellow light coarse sandy loam, slightly compact and friable, extending to 12 or 15 inches; and a subsoil layer consisting of a mottled yellow, gray, pink, and red coarse sandy clay, dense and compact, brittle when dry and plastic when wet. Scattered upon the surface, especially on steeper slopes, is found a quantity of ferruginous sandstone fragments or iron crust. Numerous rounded waterworn pebbles also are commonly present on the surface.

The Hoffman coarse sandy loam occurs upon hillsides and valley slopes throughout the Sand Hill region, and as a fringe between the Norfolk coarse sand and the surrounding Piedmont soils. The type is developed over the eastern part of the county.

The topography is fairly level to steeply sloping, the latter condition predominating. It is traversed by many small streams that have cut deep valleys, giving it a rather broken relief.

The underdrainage is checked by the heavy substratum, forcing the rainfall through the surface channels and causing active erosion. The drainage is excessive, and crops suffer for lack of moisture during dry seasons, except in places where the seepage water from higher ground makes conditions more favorable.

The Hoffman coarse sandy loam is not an important soil, its area being less than 13 square miles. Farming is not developed extensively, owing to unfavorable location and generally rough surface. Less than half of the type is cleared and under cultivation. Many abandoned fields were noticed, some covered with weeds and bushes and others with a growth of old-field pine. The original forest consists of longleaf pine, white oak, round-leaf blackjack oak, sweet gum, poplar, and dogwood.

Cotton and corn are the most important crops—the former grown upon much the larger acreage—while oats, cowpeas, sorghum, forage

corn, and rye are grown upon small patches. Cotton yields one-third to one-half bale and corn 10 to 25 bushels per acre.

The type is handled in the same general manner as the other upland sandy loam soils. Little of it is terraced, and practically no effort is made to protect the surface with cover crops. No effort is made to increase the productiveness of the soil, except by the use of commercial fertilizers. The selling price of land of this type ranges from $10 to $35 an acre.

The same methods are recommended for improvement of the type as in the case of the Hoffman sandy loam.

HOFFMAN SANDY LOAM.

The Hoffman sandy loam consists of a gray loose sand to loamy sand, passing at 6 to 8 inches into a mottled yellow, gray, pink, and red sandy clay, dense and compact in structure, brittle when dry, and highly plastic when wet. The sand in the soil is largely medium in grade, while that of the subsoil is inclined to be coarser and more angular. The depth to the clay subsoil varies to some extent. In the Sand Hill section it is in places exposed at the surface, while in others it is 15 to 20 inches below the surface. Small areas of the coarse sandy loam are included.

This soil occurs along the lower slopes to the streams in the Sand Hill region, where the sand has been removed by erosion. It is prominently developed along the edge of the sand hills. In places it reaches well up the slopes and passes over the divides. It is derived from the sandy clay beds upon which the Sand Hills rest. The surface of these beds seem to be very uneven, as the Hoffman is found outcropping at various elevations from stream level to the highest points in the Sand Hill region.

The Hoffman sandy loam is found in the southern half of the area, where it is widely scattered along the edge of the bottoms of the secondary streams.

The topography upon some of the divides is fairly smooth, but most of the surface is sloping, and in many places steep and broken. The downward movement of water is checked by the compact subsoil and substratum, with the result that the run-off is proportionally large. It is also rapid, resulting in active erosion and excessive drainage. The part of the type situated at the base of the Sand Hill belt suffers to some extent from seepage water during wet seasons, but this is decidedly advantageous to crops during dry seasons.

This soil is not important from an agricultural standpoint. Much of its surface has suffered from erosion to the extent that it has been abandoned for crop production and has grown up in old-field pine. About 50 to 60 per cent of the type is under cultivation, and most of the surface of this part is in fairly good condition. The forest

growth consists of longleaf pine, old-field pine, sweet gum, hickory, dogwood, and a scattering of oak, including the round-leaf blackjack oak.

As on all the upland soils, cotton is the most important crop and occupies the larger part of the cultivated acreage. Corn, oats, and cowpeas are the crops of next importance, and rye, sorghum, corn for forage, and sweet potatoes are planted in small patches. Small areas of the type are used for pasturing cattle and hogs.

The Hoffman sandy loam is not quite so productive as the other sandy loam soil types, cotton yielding one-third to three-fourths bale per acre, with an average of about one-half bale, and corn 10 to 35 bushels.

The same methods are used upon this soil as upon the Norfolk sandy loam and other upland sandy loams. Portions of the type are rendered difficult to handle by the nearness of the tenacious subsoil to the surface. Terracing is necessary, and even this is not entirely adequate to check erosion. Many of the terraces are broken and gullies have started in the fields.

Form 400 to 800 pounds of complete fertilizer is used upon cotton, and smaller amounts on other crops. This land sells for $15 to $45 an acre.

For the improvement of the Hoffman sandy loam thorough and careful terracing is of first importance. Grass should be grown upon the terrace or the inner side should be dragged while wet, forming a hard surface that is not easily penetrated by water. Cover crops should protect the surface as much as practicable. Where fields have become eroded Bermuda grass could be sown and the land used for pasture. Green manuring and liming would increase the productiveness of this soil.

PORTSMOUTH LOAM.

The Portsmouth loam consists of a black loam soil passing at 8 to 10 inches into a subsoil of mottled gray, drab, and yellow sticky sandy clay.

Several variations from this typical description occur. In the low areas near Boykin the surface is dark gray to almost black to a depth of 5 or 6 inches, where there occurs a layer of gray light sandy loam 6 or 7 inches thick, resting on the typical Portsmouth subsoil. Another variation occurs in small areas associated with the Marlboro soils. Here the surface soil is dark gray and the subsoil gray, mottled with drab and bluish gray in the upper part and faintly mottled with brown in the lower part. The structure is slightly more tenacious than in the typical subsoil.

The Portsmouth loam occupies low depressed areas or bays where, associated with the sandy upland soils, a rim of Portsmouth sand from 100 to several hundred feet wide surrounds the loam and in

many cases the center is almost a Muck. Most of this type is covered with water during wet seasons. These bays vary considerably in their vegetation. Some support a growth of cypress, others black gum, and some are savannas, having no tree growth. The sandy margins commonly carry a heavy growth of baybush and gallberry, with moss covering the ground. On the areas associated with the Marlboro soils the trees are mainly loblolly pine and sweet gum, and the undergrowth myrtle and gallberry.

The Portsmouth loam is widely scattered over the southern and eastern parts of the county. The largest bodies lie southeast of Canteys Lane and southeast of Boykin to the Sumter County line. The bay developments are prominent to the west and south of Bethune, near Shepard, 2 miles south from Cassatt, and 3 miles northeast of Camden. Other smaller bays are found scattered over the county.

The total extent of this soil is only a little more than 2 square miles, and probably less than 10 per cent of it is cleared and drained. These areas are used for the production of oats or crab-grass hay. Oats yield well, probably on the average better than upon any other soil in the area. The ordinary range is from 30 to 45 bushels per acre.

If thoroughly drained and limed, this soil is adapted to a wide range of crops.

AMITE SANDY LOAM.

The Amite sandy loam consists of a brown or reddish-brown mellow loamy sand to light sandy loam, 6 to 8 inches deep, passing abruptly into a red friable sandy clay, which extends to a depth of 36 inches or more. A few waterworn quartz pebbles are scattered upon the surface.

The Amite sandy loam is a fairly uniform type, there being no variations of marked importance, though along the breaks or in marginal strips the soil may be thin and the sandy clay subsoil exposed in small areas. It occurs in oval-shaped areas scattered over the terraces of the Wateree River below Camden, normally along the outer or stream edge of the terrace. The largest bodies lie three-fourths of a mile west of Stockton, three-fourths of a mile west of Hammond, and 1½ miles west of Boykin. These areas lie above overflow, standing from 20 to 30 feet above the level of the first bottom. The soil material consists of beds of stream-deposited sand and clay, accumulated when the streams flowed at a higher level than at the present time. This deposition was long enough ago to give time for marked changes to take place through leaching, erosion, and other agencies of weathering.

The topography is gently undulating, and both surface and underdrainage are well established. The subsoil and substratum both give evidence of thorough aeration.

The Amite sandy loam is one of the good soils of the county, but its total area is only 1 square mile. It is all cleared and cultivated, probably three-fourths being used for the production of cotton.

This land in conjunction with other types is valued at $100 an acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Amite sandy loam:

Mechanical analyses of Amite sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
243401	Soil	1.6	15.4	13.2	37.4	14.7	10.2	7.9
243402	Subsoil	2.0	14.6	11.3	26.0	10.6	11.4	23.8

CAHABA FINE SANDY LOAM.

The surface soil of the Cahaba fine sandy loam is a pale-yellow to yellowish-brown loamy fine sand about 8 to 12 inches deep. The soil passes into the subsoil through a transition zone of pale-yellow friable fine sandy loam, from 4 to 8 inches thick. The subsoil proper consists of yellowish-red to dull-red fine sandy clay, extending to a depth of 36 inches or more. The subsoil is compact and friable when dry, plastic when moist, and sticky when wet. The substratum in many places is mottled and includes strata of waterworn gravel.

The more important areas of this soil lie on the Wateree River terraces. The largest areas are situated in the vicinity of Hammond in the southern part of the county and west of Camden on the opposite side of the Wateree River. Smaller areas are scattered over the terraces on both sides of the Wateree and along Little Lynches and Lynches Rivers. The areas stand slightly above the other terrace soils, occupying swells running parallel with stream. The general elevation is 20 to 50 feet above the level of the first bottom and well above the ordinary flood stage of the streams. The topography is undulating and the surface drainage thorough.

The Cahaba fine sandy loam is an important soil, although it occupies a relatively small area. Nearly all the type is cleared and in cultivation. The same crops are grown as upon the upland soils. Beef cattle are grazed upon some of this land on the west side of the Wateree River and small areas near Camden are used as pasture for dairy cows. Cotton, the leading crop, produces from one-half to 1 bale per acre, according to the season and the quantity of fertilizer used. Corn with proper cultivation yields 35 to 45 bushels per acre, and where poorly handled, from 15 to 20 bushels. Oats under favorable conditions yield 30 to 40 bushels per acre, but the average is about 20 bushels. Peavine and crabgrass hay cut 3 to 4 tons per

acre. Small patches of wheat, clover, and alfalfa were noticed on this soil.

Most of this type is included in large plantations and is farmed by tenants. The methods of cultivation, which are similar to those upon the adjacent upland soils, have resulted in the depletion of the supply of organic matter. The soil is easy to till and has a good moisture-holding capacity. From 400 to 600 pounds of complete fertilizers are used upon cotton and less amounts upon other crops. Nitrate of soda is used to a small extent upon oats, corn, and cotton.

Land of this type sells for $60 to $100 an acre, according to location and improvements.

The Cahaba fine sandy loam is adapted to a wide range of crops, in addition to those now grown. It is well suited to such legumes as soy-beans, velvet beans, vetch, and clover. Tobacco of good quality is produced upon it in other sections of the State. In general the soil is in need of organic matter.

KALMIA SANDY LOAM.

The Kalima sandy loam as typically developed is a pale-yellow to yellowish-brown loamy sand to light sandy loam, 8 to 10 inches deep, passing into a subsoil of yellow friable sandy clay. The substratum and in places the deep subsoil is tough and compact and mottled with gray and red. As found along the streams in the Sand Hill section the soil is a gray sand and the subsoil in many places is similar to that of the Hoffman sandy loam.

This soil occurs on terraces lying from 5 to 20 feet above the first bottoms along the streams that flow out of the Sand Hill region and level Coastal Plain. The slope from the terrace to the first bottom is sharp and well defined, but in many places the transition from the terrace to the upland is more gradual and less definite. In places there is a strip of Myatt or Johnson material between the hill and the terrace, but in most places the Kalmia occupies the entire terrace. It is found in strips from one-fourth to one-half mile wide extending for many miles along the streams, and broken only by the channels of lateral drainage ways. The largest developments are found along Swift Creek, Timber Creek, Town Creek, and Spears Creek. The topography is fairly level to gently sloping, with slight swells running parallel to the streams. The surface drainage is well established, but the underdrainage, owing to the denseness of the substratum, is slow and imperfect, and ditches are necessary in places to remove the surplus water. The type is subject to the accumulation of seepage water from the hills or higher ground in the rear.

The Kalmia sandy loam occupies an area of 12 square miles. It is mainly cleared and under cultivation. The forest covering consists of pine, water oak, sweet gum, tulip poplar, and dogwood. Cotton,

corn, and oats are the most important crops. A fair acreage is devoted to cowpeas. Other crops are not grown. Cotton yields from one-third to 1 bale per acre, according to season, fertilizer, and cultivation. In wet seasons the yields are reduced by excess moisture. Corn yields 20 to 35 bushels per acre, and oats give fairly good returns where fertilized. Heavy cuttings of peavine and crabgrass hay are obtained. The methods of farming this soil are the same as employed on the Norfolk sandy loam. Much of the type is rented and little attempt is made to maintain its productiveness.

There are usually few improvements on this type and much of it is unfavorably situated. It sells for $20 to $45 an acre, with a few more desirable areas held at higher prices.

The methods for improving the Norfolk sandy loam would apply fairly well to this soil. Many areas could be improved by more thorough drainage. Lime applied at the rate of 1,000 pounds per acre would benefit crops on much of the land, which is usually acid. With the use of 800 to 1,000 pounds of high-grade fertilizer heavy yields of a good grade of light tobacco are obtained from this soil in other counties in this State.

KALMIA FINE SANDY LOAM.

The Kalmia fine sandy loam as typically developed is a pale-yellow to grayish-brown fine sand to loamy fine sand about 6 to 12 inches deep, grading quickly into a light-yellow loamy fine sand to fine sandy loam which extends to 15 to 20 inches. The subsoil proper consists of a yellow friable fine sandy clay, mottled with gray and red below 24 to 30 inches. The substratum is essentially the same as the lower subsoil, except that the gray mottling is more pronounced. Beds of waterworn gravel are often encountered at 6 to 10 feet below the surface. Near the Camden Bridge are areas in which the fine sandy surface soil is deep and the texture of the subsoil is light and the structure not compact as in the remainder of the type.

This is a terrace of second-bottom soil lying 20 to 40 feet above the first bottom and marked by a sharp break to the bottoms, except where other types intervene. It is most prominently developed on terraces of the Wateree River between Camden and the river and around Lugoff. Other smaller developments lie along Lynches and Little Lynches Rivers and some of the larger secondary streams. The type is associated with the Cahaba fine sandy loam and the Myatt fine sandy loam, the Cahaba usually occupying the more rolling areas of the terrace, the Myatt the low flat areas, and the Kalmia the intermediate areas. The topography is fairly level to gently undulating. The surface drainage is fairly well established, while the underdrainage is restricted by the close-structured subsoil

and substratum. Parts of the type are well drained, but much of it has been improved by artificial drainage.

The Kalmia fine sandy loam, of which there is about 7 square miles, is a fairly important soil. Probably 75 per cent of it is under cultivation. On uncleared areas there is a growth of shortleaf pine, sweet gum, water oak, white oak, and a scattering of other hardwood trees. Practically all of this soil has been under cultivation in the past. Cotton, oats, corn, and cowpeas are the important crops, ranking in the order named. Most of the other crops grown in the county are produced on small acreages. Some of this land which is covered by fairly good sod of native grass is utilized for pasture. Cotton yields one-half to 1 bale per acre, corn 25 to 45 bushels, and oats 20 to 45 bushels. Heavy cuttings of peavine and crabgrass hay are obtained.

The same methods are followed as upon the Cahaba fine sandy loam. There are upon this soil some well-improved farms that make use of modern labor-saving machinery. Many of the unimproved fields are low in organic matter, and even where the best farming is done it has not been increased very much. The fertilizer used is practically the same as upon the upland sandy soils, 400 to 800 pounds of 8–3–3 or 8–4–4 grade for cotton and smaller amounts for corn. Nitrate of soda is used as a top dressing for cotton, corn, and oats.

Improved farm land of this type sells for $65 to $100 an acre, and unimproved land for $20 to $40 an acre.

For the improvement of this type, artificial drainage where needed, the addition of organic matter, and the application of lime, are steps to be taken. The type is fairly well adapted to the crops grown at present. It is used for the production of tobacco in other parts of the State and may be so used in Kershaw County.

KALMIA VERY FINE SANDY LOAM.

The surface soil of the Kalmia very fine sandy loam consists of 6 to 8 inches of a pale-yellow to yellowish-brown very fine sand to very fine sandy loam. This grades quickly into a yellow, heavy fine sandy clay, which rests at a depth of 24 to 30 inches upon mottled yellow, gray, and red heavy clay. The surface soil is fairly compact but friable, the upper subsoil is stiff but brittle, and the lower subsoil is stiff, impervious, and when wet, plastic.

The type is fairly uniform throughout its extent, with the exception of a few small areas in which the surface soil is shallow and tends toward a silt loam texture. The subsoil of this type is closer and more compact than that of the other Kalmia types, the deeper subsoil more closely resembling that of the Leaf soils.

The Kalmia very fine sandy loam is mapped on terraces along the larger streams. The areas are not large, the largest occurring along the Wateree River below Big Pine Tree Creek. The type lies from 10 to 25 feet above the first bottoms. The topography is level or gently undulating to gently sloping. The surface has been cut in places by streams flowing from the upland to the river swamps. Surface drainage is fairly well established, but the underdrainage is retarded by the heavy subsoil and substratum. Ditches are necessary in the low places to assist in removing the excess rainfall. The uncultivated surface becomes hard in dry seasons. When cultivated at the right moisture content the soil breaks into good tilth, but when cultivated too wet it has a tendency to clod. The soil holds moisture fairly well, but is slow to warm up in the spring.

The Kalmia very fine sandy loam is not important from a farming standpoint. About 60 or 70 per cent of it is cleared and cultivated. The tree growth upon the remainder consists of pine, water oak, and sweet gum, with a scattering of other hardwood trees. Cotton and corn are the chief crops. Some oats and cowpeas are grown. Cotton yields one-third to three-fourths bale, according to season, cultivation, and fertilizer, and corn 10 to 30 bushels per acre. The farming methods are similar to those practiced on the other terrace soils. Cotton is planted upon high beds. Corn is planted in more shallow furrows than upon the sandier soils. No cover crops are grown, and green manuring is not practiced. Commercial fertilizer is used upon the principal crops, from 300 to 500 pounds of 8–3–3 grade being applied to cotton, and smaller amounts or none at all to other crops. Some nitrate of soda is used upon corn and oats. Most of this land is farmed by tenants.

Land of this type sells from $20 to $60 an acre according to location and improvements. There are very few houses or buildings upon it, owing to its position near the river swamps.

Artificial drainage is necessary upon this soil to take care of the rainfall during the wet seasons. This can best be accomplished by a system of open ditches. Better drainage would improve the condition of this soil in the spring, enabling work to begin earlier. Cover crops should be grown to turn under, so that the organic content can be increased, thus improving its physical condition and power to retain moisture. Applications of lime would be beneficial, as this soil is acid. When properly drained the type is fairly well suited to cotton, small grains, and grass.

MYATT FINE SANDY LOAM.

The soil of the Myatt fine sandy loam is a dark-gray (black in the immediate surface) slightly compact but loamy fine sandy loam, 8 to 12 inches deep. The subsoil is a light-gray sticky fine sandy clay,

mottled with drab, yellow, and rusty brown. In many places the deep subsoil is waterlogged. Small areas are included in which the proportion of medium sand is relatively large, these areas occurring along the streams that head in the Sand Hill region. Small spots are scattered over the area, mainly around stream heads, where the surface soil is more silty than typical.

The type occupies low areas on the terraces, commonly at the foot of the upland slopes. In many places water stands upon the surface in wet seasons. The largest areas of this soil occur along the Northwestern Railroad of South Carolina, southeast of Camden. Smaller areas lie along Big Pine Tree Creek near McRae Pond. On the west side of the river several developments are found between Gillies Ditch and the upland. Other small areas are scattered over the southeastern part of the county. The surface is flat, giving poor surface drainage, and the underdrainage is retarded by the close-structured substratum. A few small sluggish streams head in the type.

The Myatt fine sandy loam is used for crop production to such a small extent as to be negligible in the present agriculture. All but a few acres of the land is covered with forest, consisting mainly of loblolly pine and sweet gum, with a considerable undergrowth of gallberry. A very few small patches of corn and oats were noticed. Much of the forested area is utilized for ranging cattle and hogs. This is burned over each season to promote a tender growth of grass.

The selling price of this land is very low, ranging from a few dollars to $10 an acre.

Poor drainage is the principal cause of the nonuse of this soil. The type occupies a depressed position, but lies high enough above the first bottom to give the required fall for drainage. To drain the larger bodies extensive systems of main and lateral ditches would be required; the drainage of the small areas would be a comparatively simple matter. When properly drained the land would be suited to a wide range of crops, though probably best adapted to corn, oats, and grasses. Liming would improve the drained areas.

LEAF SILT LOAM.

The soil of the Leaf silt loam, to about 4 to 5 inches, consists of a light-brown fairly heavy silt loam mottled with small spots of dark brown. This passes into a subsurface layer of mottled light-gray and yellow light silt loam, more friable and open in texture than the soil. The subsoil proper, encountered at 10 to 12 inches below the surface, consists of a mottled gray, yellow, and red heavy silty clay to clay, compact and plastic, the red mottling becoming more pronounced with depth.

The Leaf silt loam occurs mainly on terraces of the Wateree River south of Camden. The largest area lies on the west side of the river near McCaskill. Others lie near Deloach and just south of Stockton, east of the river. Smaller areas are scattered over the terrace between Big Pine Tree Creek and the Sumter County line.

The type occupies a low position, standing only a few feet to 10 feet above the first bottom, and is subject to overflow during high floods. Its topography is flat to very gently sloping and the drainage poor.

Most of this land is in forest, consisting mainly of shortleaf pine, sweet gum, water oak, and white oak, with very little undergrowth. The small areas cleared are utilized entirely for grazing. They are burned over each season to improve the pasturage. This land has a comparatively low value.

If drained this soil would be much more valuable for grazing than at present, and it could also be used for the production of hay, wheat, and oats. Some organic matter should be added, and lime applied to correct acidity. Plowing should be shallow at first and gradually deepened.

CONGAREE LOAMY FINE SAND.

The soil of the Congaree loamy fine sand is a brown mellow loamy fine sand, containing large quantities of mica flakes, extending in places to a depth of 3 feet with little change in color or texture. In other places the subsoil below 10 or 12 inches is a lighter brown in color and lighter in texture. In places the sand content is medium. Some areas of fine sandy loam are included with the loamy fine sand as mapped, and areas of Riverwash in which the sand is medium rather than fine in grade have not been separated.

This soil occurs in narrow strips along the bank of the Wateree River, between the Camden Ferry and the dam of the power house. It also forms irregular strips in the large bends just below Camden. The areas are somewhat higher than the rest of the bottom lands, in most places occurring as a natural levee. The topography is gently rolling and the drainage, between overflows, thoroughly established. The soil material is derived mainly from wash from the Piedmont soils.

Most of the type is covered with a growth of elm, willow, cottonwood, sycamore, and birch. A heavy growth of cane forms a part of the undergrowth over most of the forested area. This soil is not important from an agricultural standpoint, though small acreages of corn, oats, cowpeas, and melons are grown. Crop production is rather uncertain, owing to overflow. Corn apparently gives good yields. Peavine and crab grass hay returns heavy cuttings. Oats do fairly well. The native grass in uncultivated areas is not heavy,

but the canebrakes furnish good grazing for cattle, and some cattle and hogs are kept upon the land. Fertilizers are not used upon this soil.

This soil is well suited to legumes, such as cowpeas and vetch, but corn is probably the most profitable crop that can be grown. Lespedeza comes in naturally upon cleared fields. Sorghum should prove a profitable crop. Melons and light truck crops also should succeed. Cattle raising might well be extended.

CONGAREE SILT LOAM.

The soil of the Congaree silt loam is a brown mellow silt loam 8 to 10 inches deep, passing imperceptibly into a subsoil of slightly lighter brown color, slightly more compact structure, and heavy silt loam to silty clay loam texture. This type is developed under two conditions in this county—(1) as the high, well-drained first bottom of the Wateree River; (2) as the poorly drained first bottom along the larger streams heading in the Piedmont region. The largest and most important areas occur in the first position; the areas in the second position are low and swampy, and as a rule unfit for crop production in their native state.

This soil, as developed along the Wateree River, has a fairly level topography, with slight swells and occasional sloughs or low troughs running with the direction of the main water course. The soil on the swells grades toward a very fine sandy loam in texture, while the lower areas are heavy, approximating a silty clay loam. The type is developed near the river and in the big bends below Camden. It is used extensively for farming, and from 75 to 80 per cent of it is under cultivation or in cleared pastures. The forest consists chiefly of sycamore, elm, ash, water oak, and sweet gum. Large canebrakes occur in virgin areas.

Corn, cotton, oats, and cowpeas are the principal crops, corn occupying the largest acreage. Yields are good, but there is risk of serious damage or complete destruction of the crop by floods. Cotton yields three-fourths to 1 bale and corn 30 to 60 bushels per acre. Oats yield heavily, but have a tendency to lodge. Exceptionally heavy cuttings of peavine and crab-grass hay are obtained. Some cattle, sheep, and hogs are kept upon this land.

This soil was brought under cultivation early in the settlement of the country. Prior to 1860 many dikes were constructed to keep the high water off the land, but most of these have broken and crop production is very uncertain. Most of the low places have been ditched, but many contain water. Not as much attention is given to farming this soil as formerly, owing to the risk.

This land is usually wet and cold in the spring. As soon as in condition, the land is plowed broadcast and harrowed with disk har-

rows. Tractors are used upon the larger farms, but most of the plowing is done with two-horse plows. This soil can not be worked under as wide a range of moisture conditions as the sandy soils, and if plowed or cultivated wet it clods badly. Commercial fertilizer and manure are not used.

Land of this type is held in large tracts, and very little of it has changed hands in recent years. The selling price varies from $25 to $60 an acre.

As developed along the secondary streams heading in the Piedmont region, the bottom land is more variable in texture. Beds of sand occur near the streams and sloughs, in which the soil approaches silty clay loam near the foot of the slopes descending from the terrace or upland. Here small spots of Wehadkee silt loam are included. In the crystalline region, where the soils are prevailingly coarse in texture, small areas occur, especially along the edge of the bottoms and at the mouths of small streams, in which the soil contains a considerable amount of very coarse sand and gravel.

Only small areas of the Congaree silt loam in this position are cleared, drained, and used for farming. The tree growth consists of sycamore, sweet gum, willow, and bay bushes. Corn and oats are the chief crops. These give yields that compare favorably with those on areas of the type lying along the Wateree River. The crops are uncertain, owing to the numerous floods occurring during the summer months. Much of the land is in pasture and furnishes good grazing. Numbers of cattle and hogs are kept upon these pastures.

The Congaree silt loam is inherently one of the most productive soils in the county, but along the large streams it lacks protection from floods, which can only be supplied by a comprehensive system of levees. On the smaller streams straightening channels and ditching would prevent many of the damaging floods. More thorough drainage is needed over most of the type. This soil is one of the best corn soils in the State. It is also well suited to the production of oats and grass for hay and pasture. Small grains have a tendency to lodge. Sorghum suffers very little from overflow and can be grown very successfully upon this soil.

CONGAREE SILTY CLAY LOAM.

The Congaree silty clay loam has a soil 6 to 8 inches deep, composed of a brown fairly compact silty clay loam. This grades imperceptibly into a slightly lighter brown silty clay loam which in turn passes to 15 to 20 inches into a mottled gray, brown, and rusty-brown plastic silty clay. Several variations from this typical description occur. In many places near the valley walls or in swales the subsoil below 20 inches is dark gray or drab in color, and

mottled with brown. Some low places and old stream channels exist in which the surface soil to a depth of a few inches is quite black and the subsoil mottled with drab and brown. In other places, near the outer edge of the bottoms, there are small beds of sand.

This soil occurs as first-bottom overflow land along the Wateree River below Camden. It extends on both sides of the river, occupying most of the bottom which averages 3 miles wide and 10 miles long from Big Pine Tree Creek to the Sumter County line. Most of this bottom is subject to deep floods, the surface being covered to a depth of 10 to 20 feet or more. Practically all the type is in forest, consisting mainly of tupelo, sweet gum, ash, water maple, water oak, and cypress. Very little grass or other undergrowth is found upon this soil. The surface is low and nearly level, but cut by numerous sloughs. In its present state the land is unsuited for cultivation. Formerly some of the type was used for rice growing, but the dikes are broken, ditches filled, and tree growth has reached normal size since the fields were abandoned. The land is utilized to a small extent for ranging cattle and hogs. It is held in large tracts and little of it has changed hands recently. It is valued chiefly for its forest products. The cost of reclaiming this land for crop production would be prohibitive under present conditions.

WEHADKEE SILT LOAM.

The Wehadkee silt loam has a surface soil of light-brown or grayish-brown to brownish-gray silt loam, 7 to 10 inches deep, underlain by a mottled gray, yellow, and brown silt loam to silty clay loam which extends to 3 feet or more. In places near the stream edge and upon swells the surface has a decided brown cast resembling the Congaree soils. Spots of silty clay loam are common, occurring in low places and swales throughout the type. The soil in these low spots ordinarily contains a large percentage of organic matter. The cleared areas are usually lighter and grayer than the virgin soil. There are included small areas of sandy loam; these bottoms are locally influenced by wash from the Sand Hills.

The type is developed upon the secondary streams that head in or carry drainage waters from the soils of the Slate Belt. It occurs as comparatively narrow strips from 200 feet to one-half mile wide of first bottoms. The topography is level, with a few low ridges and swales. The drainage is poor. Besides being flooded by the streams, it receives seepage water from the surrounding hills. The stream channels are better defined than those in the Coastal Plain, and the surface of the bottoms is 3 to 5 feet above stream level.

Possibly 10 per cent of this soil is cleared and under cultivation, the remainder being covered with a forest, consisting mainly of short-

leaf pine, oak, ash, sweet gum, maple, and a fairly thick growth of underbrush. Cotton, corn, and oats are the principal crops. In favorable seasons they make fairly good yields, but crops are uncertain, owing to overflows. Much of the type is utilized as pasture for cattle and hogs. The native grasses and lespedeza, which comes in voluntarily, furnish fair grazing in the cleared areas. There is very little grass in the forested areas.

The market value of this land, like most bottom land along small streams, is governed by the price of the adjacent upland. It sells for $10 to $35 an acre.

Better drainage is the greatest need of this type. This can be accomplished by straightening and clearing out the main stream channels and by digging lateral ditches. When drained, lime could be used to advantage to sweeten the soil and improve its physical condition, and the land then should be well suited to the production of corn, oats, cowpeas, hay, forage crops, and vegetables.

WEHADKEE SILTY CLAY LOAM.

The soil of the Wehadkee silty clay loam is a grayish-brown to yellowish-brown silt loam to silty clay loam, passing at 6 to 10 inches below the surface into a gray mottled silty clay with yellow, drab, and brown. In places the surface soil contains a relatively large quantity of organic matter, and it is normally friable in structure, while the subsoil is fairly compact, sticky, and plastic. Near the streams, spots occur in which the soil is a silt loam in texture. Small, low, swampy areas are common. In these the surface soil approaches a black color.

This type occurs in the bottoms of the larger streams receiving their wash partly from Piedmont soils, in which the Georgeville and Alamance soils predominate, and partly from Coastal Plain soils. The type is developed along Lynches River below the mouth of Buffalo Creek, the area attaining a maximum width of 1 mile. It also lies along Little Lynches River below the mouth of Hanging Rock Creek. The surface is level, except for a few slight swells and swales and lies only a few feet above stream level. It is subject to overflow and poorly drained.

Agriculturally this land is of little importance. It is not cleared or drained. It supports a heavy growth of loblolly pine, gum, ash, and maple, with an admixture of other trees.

Adequate drainage of this type would require an extensive canal system along the main streams. If reclaimed this soil would be suited to the same crops as the silt loam.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Wehadkee silty clay loam:

Mechanical analyses of Wehadkee silty clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
243453	Soil	0.0	0.2	0.6	2.7	8.6	54.6	32.8
243454	Subsoil	.2	.8	.5	9.2	9.7	50.9	28.7

JOHNSTON LOAM.

The soil of the Johnston loam is a dark-gray to black loam, which may extend to 3 feet or more, or may be underlain at about 12 to 15 inches by a gray clay loam, mottled with spots of drab and rusty brown.

There is some variation in the surface soil. Along many of the smaller streams that head in the Sand Hills, along other streams at points where drainage ways enter from sandy soils, and at road crossings the sand content of the soil is relatively high. Bottoms of the main river extend back along the lower courses of the larger lateral streams, in which the proportions of silt and clay are greater than typical, the texture of the surface soil approaching a clay loam. This latter condition is due to sedimentation in the quiet backwaters during flood periods.

The Johnston loam is developed along practically all the streams that head in the Coastal Plain or Sand Hill regions, the areas ranging from a few hundred feet to about one-half mile in width. The surface is flat and stands but little above the normal water level of the stream. It is nearly all in a semiswampy condition.

With the exception of a few areas that have been cleared, this type is covered with a heavy forest, mainly of black gum. In places loblolly pine, ash, maple, sweet gum, and ironwood grow and in a few places there is much cypress. Practically no grass grows upon this land. The few small patches cleared are planted to corn and oats, which give fairly good yields. The fields are ditched to remove the seepage water. This land is usually held in conjunction with other soils. Aside from the timber it has little present value. It is utilized for ranging cattle and hogs.

The Johnston loam could be utilized for crop production if the main channels of the swamps were canaled. Properly drained it would produce good crops of corn, oats, and vegetables.

SUMMARY.

Kershaw County is situated in the north-central part of South Carolina. It covers an area of 760 square miles or 486,400 acres. Physiographically it lies upon the "fall line" between the Piedmont Plateau and the Coastal Plain. The topography varies from

level to hilly. The elevation ranges from 200 to 650 feet above sea level. Drainage is well established over most of its extent.

According to the 1920 census the population of Kershaw County is 29,398—86.6 per cent of which is classed as rural. Camden, with a population in 1920 of 3,930, is the county seat and most important town.

Two railroad lines traverse the county, intersecting at Camden, and a third line extends from this point southeast to the Sumter County line.

The main wagon roads are mostly of sand-clay construction. The secondary roads are poor.

Camden is the central market for the county, and Columbia the nearest large outside market. Cotton is ordinarily marketed locally or at the nearest town.

The climate of Kershaw County is characterized by mild, short winters and long, hot summers. The mean annual precipitation is 44.42 inches. The rainfall is well distributed throughout the year. There is a long growing season.

Cotton, the important cash crop, occupies 42 per cent of the total crop acreage of the county. Corn, oats, and cowpeas are grown to feed the work stock. Wheat, rye, vetch, clover, alfalfa, peanuts, tobacco, and melons are minor crops. Sweet potatoes and other vegetables and fruits are grown for home use.

Little attention is given to stock raising, except along the larger stream bottoms, where a number of cattle are kept.

The topography in a measure controls the area under cultivation. The rougher areas, owing to erosion, or in the Sand Hills to the deep sand soils, are not cultivated, and the low, poorly drained soils are used to slight extent for crops. The recognition given to adaptation of soils to crops is only general, nearly all crops being grown on all soils.

The methods do not vary over the county and are the same as practiced over this general region. The fields are left bare during the winter, except for the small acreage in oats. The farm equipment ranges from poor on the Sand Hill and rough Piedmont farms to good on the Red Hill and Coastal Plain farms. The plowing as a rule is shallow, and little preliminary preparation is given the land before bedding. Rotations are not generally practiced. Little manure is available and green manuring is not practiced. Large quantities of commercial fertilizer are used. Probably four-fifths of the total is applied to cotton.

Relatively little labor is hired. Most of the farm laborers are negroes, fairly efficient in the cultivation of cotton.

The average size of farms in 1920 was 71.9 acres. Sixty-seven per cent of the farms are operated by tenants.

The selling price of farm land varies widely. Remote and less desirable land is valued at $35 and less an acre, while the best land brings $60 to $100 or more an acre.

Three soil provinces are represented in Kershaw County: the Piedmont Plateau, a region of residual soils from granite, gneiss, schist, and slate; the Coastal Plain province, in which occur sedimentary soils, derived from unconsolidated beds of sand, clay, and gravel; and the River Flood Plains province, which includes soil from old and recent alluvial deposits.

The Cecil, Appling, Georgeville, Alamance, Chesterfield, and Bradley series of soils are developed in the Piedmont region; the Norfolk, Marlboro, Ruston, Orangeburg, and Portsmouth series occur in the Coastal Plain; the Amite, Cahaba, Kalmia, Myatt, and Leaf series lie upon terraces, and the Congaree, Wehadkee, and Johnston series (recent series) occupy the River Flood Plains province.

The Cecil gravelly sandy loam, the most extensive soil in the Piedmont region, forms about 8 per cent of the area of the county. About 50 per cent is cropped, but nearly all of it was cultivated at one time. It is adapted to general farm crops.

The Cecil gravelly clay loam is less extensive. Seventy-five per cent is under cultivation. It is adapted to general farm crops.

The Appling sandy loam is practically all under cultivation. It is well suited to general farm crops and tobacco.

The Georgeville silt loam is fairly productive. From 50 to 60 per cent is under cultivation to general farm crops. A number of idle fields were noticed.

The Georgeville silty clay loam is a fairly strong soil. About 75 per cent is under cultivation. It is adapted to the production of cotton and small-grain crops.

The Alamance silt loam occurs as small, fairly level to gently sloping areas, and is more or less poorly drained. It is used to a small extent for crop production. The yields are ordinarily low.

The Bradley sandy loam, while not extensive, is a valuable soil. It is practically all utilized for farming and gives good yields of the staple crops.

The Chesterfield coarse sandy loam is inextensive. It has a gently sloping surface, but underdrainage is poor. Crop production is low.

The Norfolk sand, developed in the Sand Hill region, is the most extensive soil in the county. It is largely utilized for general farming. Fair yields are obtained, in average seasons, with the use of commercial fertilizer. The Norfolk sand, sandhill phase, is characterized by a more rolling to hilly topography and a greater depth of sand than the typical soil. Drainage is largely internal and is excessive. This phase is used to a very small extent for crops.

The Norfolk coarse sand has about one-sixth the area of the sand. The topography is fairly level and the drainage is adequate. Land of this type is utilized for growing the general farm crops, which, when heavily fertilized, make fairly good yields in favorable seasons. The loamy phase of this type covers only a few square miles and is unimportant.

The Marlboro soils are strong soils used for the production of general farm crops. They are well suited to the growing of cotton and small grains.

The Ruston sandy loam is a well-drained soil of the Coastal Plain. It gives good yields of general farm crops.

The Ruston loamy coarse sand has a smoother surface than the preceding type. It has the same use and gives about the same results.

The Orangeburg sandy loam is developed in comparatively small areas. Drainage and aeration are both good. It is one of the best cotton soils of this section.

The Hoffman soils are developed throughout the Sand Hill region. About half their area is used for crop production. Fair yields are obtained.

The Portsmouth loam occupies small, poorly drained depressions throughout the Sand Hill and level Coastal Plain regions. It has very poor drainage, and only a small area is farmed. This is used mainly for growing oats.

The Amite sandy loam is developed to a small extent on the terraces of the Wateree River. The surface is gently undulating and well drained and aerated. It is a strong soil and well adapted to cotton and truck crops.

The Cahaba fine sandy loam, also a terrace soil, is fairly productive. Cotton and corn are the chief crops.

The Kalmia soils are fairly well drained terrace types of relatively small extent. They have a topography favorable for farming and are valued locally for the production of general farm crops, cotton and oats predominating. Fair yields are obtained.

The Myatt fine sandy loam occupies very low, flat terraces, and is poorly drained. It is little used for agriculture. Drainage is its greatest need.

The Leaf silt loam occupies low, poorly drained terraces. It is utilized to a small extent for farming. Most of the cleared areas are in pasture.

The Congaree soils occur along the stream bottoms that receive their drainage from Piedmont soils. The silt loam of this series is fairly well drained, lying slightly higher than the low bottoms covered by the silty clay loam. It is utilized to a small extent for growing corn, oats, hay, and cotton. Heavy yields are obtained when the

crops escape damage by floods. The silty clay loam occupies low bottoms subject to deep inundations. It is not used for crop production, but is used for ranging cattle. The loamy fine sand occupies narrow strips along the stream edge of the Wateree River. It is well drained, but subject to overflow and little used for crops. It supports a heavy growth of cane.

The Wehadkee soils are subject to overflow, are poorly drained, and little used for farming.

The Johnston loam is developed along the streams that flow from the Sand Hill and Coastal Plain regions. It is in a semiswampy condition and is utilized to a small extent for growing crops. It has some value as a range for cattle and hogs.

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U. S. DEPT. OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP

SOUTH CAROLINA
KERSHAW COUNTY SHEET

LEGEND

Alamance silt loam — As	Kalmia fine sandy loam — Ks
Amite sandy loam — Al	Kalmia very fine sandy loam — Kl
Appling sandy loam — Ap	Leaf silt loam — Le
Bradley sandy loam — Bs	Marlboro sandy loam — Ms
Cahaba fine sandy loam — Co	Marlboro fine sandy loam — Ml
Cecil gravelly sandy loam — Cs	Myatt fine sandy loam — Mf
Cecil gravelly clay loam — Cg	Norfolk coarse sand — Ns
Chesterfield coarse sandy loam — Cc	Norfolk coarse sand, Loamy phase — Nc
Congaree loamy fine sand — Cf	Norfolk sand — N
Congaree silt loam — Cl	Norfolk sand, Sandhill phase — N
Congaree silty clay loam — Cy	Norfolk sandy loam — Ns
Georgeville silt loam — G	Orangeburg sandy loam — Ol
Georgeville silty clay loam — Gl	Portsmouth loam — P
Hoffman coarse sandy loam — H	Ruston loamy coarse sand — Rc
Hoffman sandy loam — Hl	Ruston sandy loam — Rs
Johnston loam — Jl	Wehadkee silt loam — W
Kalmia sandy loam — K	Wehadkee silty clay loam — Ws

CONVENTIONAL SIGNS

CULTURE
(Printed in black)

- City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort
- Secondary roads and Trails
- Railroads, Steam and Electric
- Bridges, Ferry
- R.R. crossings, Tunnel
- Ford, Dam
- School or Church, Cemeteries
- Mine or Quarry, Mine dumps, Made land
- Bluff, Escarpment, Rock outcrop and Triangulation station
- Stony and Gravelly areas
- Soil boundaries
- State and County Boundary lines
- Land Grant, City or Village Boundary lines
- Civil Township and Reservation Boundary lines
- U.S. township and section lines

RELIEF
(Printed in brown or black)

- Contours, Depression contours
- Prominent Hills, Mountain Peaks
- Sand, Wash and Sand dunes
- Shore and Low-water line, Sandbar

DRAINAGE
(Printed in blue)

- Streams
- Lakes, Ponds, Intermittent lakes
- Intermittent streams
- Springs, Canals and Ditches, Flumes
- Swamp, Salt marshes
- Submerged marsh, Tidal flats

The above signs are in current use on the soil maps. Variations from the usual forms appear on the maps of certain areas.

W. E. McLendon, Inspector.
Soils surveyed by W. J. Latimer, in charge
W. B. Cobb, W. E. McLendon,
Cornelius Van Duyne and W. S. Eckmann

Scale 1 inch = 1 mile
1 ½ 0 1 2 3 4 Miles

Field Operations
Bureau of Soils
1919